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Memorandum for Special Assistant to the President, Acquisition Workforce Career Management (AWCM)

Attn: Mr. Garry Shafovaloff

Subj: CNA Research Memorandum D0018333.A1, *Improving the Certification, Training, and Development of the AT&L Workforce Program (Management Career Field: Competency Validation and Workforce Assessment)*, Jul 2008

This research memorandum is the documentation for task 13 of the *Defense Acquisition University (DAU) Competency Management* study and is being forwarded for review and comment. If you have any comments or questions, please contact Mark Tregar at (703) 824-2912. We request your comments by 4 August so that we may publish the final version by 18 August.

This version of the document contains preliminary analysis that is subject to further review and modification. Please do not quote, cite, or disseminate further without the express approval of Dr. Aline Quester, Vice President for the Resource Analysis Division (Acting).

A handwritten signature in black ink that reads 'Henry S. Griffis'.

Henry S. Griffis
Director
Defense Workforce Analyses

Improving the Certification, Training, and Development of the AT&L Workforce

Program Management Career Field:
Competency Validation and
Workforce Assessment

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Executive Summary

Background

In the most recent Acquisition, Technology, and Logistics (AT&L) Human Capital Strategic Plan (v 3.0), the Defense Acquisition University (DAU) outlined the human capital agenda to assist senior leaders in developing workforce strategies in order to improve certification, training, and development for the AT&L workforce. To this end, DAU asked the Center for Naval Analyses (CNA) to develop Competency Models for each of the primary career fields within the AT&L workforce. To create these Competency Models CNA devised a standardized four-phase Competency Development and Management Process. In this report CNA documents the validation of the PM Competency Model, Phase IV of the process, which includes:

- **Validate the Competency Model** by testing the proposed Competency Model's applicability to the PM workforce through analysis of respondent ratings.
- **Develop a data-based Competency Model structure** based on as analysis of respondent ratings.
- **Develop proficiency standards** for use in future applications and sustainment of the model.
- **Provide a gap analysis** at the competency level for Journey and Senior career-level respondents.

Competency Development Methodology

The current PM Competency Model has undergone a development process that is in-line with the Office of Personnel Management (OPM) procedures. This process is grounded in the research litera-

ture and has been proven successful in developing competency models in both private and public sectors (Lucia and Lepsinger, 1999; Shippmann et al., 2000; Marrelli, Tondora, and Hoge, 2005). The competency model that we evaluated in this assessment includes competencies from each of the 11 topic areas signed by Mr. Ahern in 2007 (1. Management Process, 2. Information Management (IM)/Information Technology (IT), 3. Systems Engineering; 4. Software, 5. Science and Technology (S&T) Management, 6. Test and Evaluation (T&E), 7. Life Cycle Logistics (LCL), 8. Contracting, 9. Business Cost Estimating and Financial Management, 10. Production, Quality & Manufacturing (PQM) and Fielding/Deployment, and 11. Professional Competencies). Under the 11 topic areas, we utilized 35 competencies defined by 45 behaviorally-written elements. Phase IV assessment respondents rated the each of the elements. These elements were deemed most representative of requirements of the job through workshops with subject matter experts and Program Management functional leads.

Participation and Sample

We e-mailed an invitation from CNA's Competency Assessment (COMPASS) website to a randomly selected set of 4,271 participants. A total of 1,568 completed the assessment for a total response rate of 36.7 percent. Using these results, we compared the current sample's characteristics to that of the PM population at large and found them to be comparable. For example, our sample was comparable to data provided by FY 2007 PM workforce data provided by DAU on percentage of the workforce from each of the Major Service Component, representation and percentage of the workforce for military/civilian status among other demographic variables.

Validation of the Competency Model

Establishing that the competencies are related to the job of a Program Manager is the objective of this validation assessment report. We asked each participant a standardized set of questions to include items related to frequency, criticality, and proficiency for each competency in our Competency Model.

Specifically, for frequency ratings we asked each respondent “How often do you do this activity in your job?” with ratings ranging from (1-Almost Never to 5-Very Frequently). For criticality, we asked “How critical is this activity in your job?” with ratings ranging from ‘1-Not Critical’ to ‘5-Extremely Critical’. For proficiency, we asked “Rate how proficient you are at the competency element behaviors.” with ratings ranging from ‘0 -No exposure to, or awareness of, this element’ to ‘5-Expert: Applies the knowledge area in exceptionally complex situations’.

Our results show that our respondents did not over-estimate their proficiency ratings. In fact, when compared to supervisor ratings, our respondents in fact rated the competencies lower by .36 across all competencies. This is a positive indicator of competency development as studies have shown that clear and specific behavioral dimensions, such as our competencies, allow respondents to give more honest answers and avoid leniency bias.

Five Technical Competencies Had the Highest Ratings Across Frequency, Criticality, and Proficiency Ratings

The competencies that are performed the most often, are critical to their job, and have the highest proficiency ratings are:

- 1.8 Working Groups and Teams
- 1.6 Risk and Opportunity Management
- 1.2 Concept Selection Process (Pre-Project/Pre-Program); Technology Development Strategy
- 8.3 Prepare and Issue Solicitation
- 8.2 Prepare Requirements & Support Documentation.

This suggests that across the Program Management competency element behaviors related to teamwork, risk and opportunity management, concept/strategy development, and overseeing the contracting functions are core to successfully performing the job. Behaviors related to these competencies should be used to evaluate the effectiveness of program managers and the human capital programs that develop and support them.

Three Professional Competencies Had the Highest Ratings Across Frequency, Criticality, and Proficiency Ratings

The top professional competencies across frequency, criticality and proficiency are:

- Interpersonal Skills
- Team Building
- Accountability

Across the PM career field, respondents stated that the professional competencies were critical to their job and performed very often. In addition, PM respondents rated themselves highly on proficiency. This suggests that relational skills should be understood by all Program Managers as important to being successful on the job

Recommendations

Use the New Competency Model Structure to Assess the Workforce

As part of our validation process we created a final Competency Model structure. We conducted a factor analysis to better understand the underlying relationships between the competencies. Past studies have documented the use of factor analysis in developing Competency Model structure (Boyatzis, 1999, Bartram and Brown, 2005, Hausmann and Tregar, 2006). Our analysis revealed a factor analytic structure with nine Units of Competence:

- Unit 1: Information Management (IM), Information Technology (IT), and Software Management
- Unit 2: Overseeing Contracting and Cost Estimating
- Unit 3: Life-Cycle Planning and Production
- Unit 4: Managing Programs and People
- Unit 5: Process Management
- Unit 6: Life-Cycle Budgeting and Financial Planning

- Unit 7: Technical Management Process
- Unit 8: Identify and Protect Technologies
- Unit 9: International/Joint/Inter-Agency Program Management

In addition to the nine Units of Competence encapsulating all technical competencies, we placed the professional competencies in a separate tenth Unit of Competence: called PM Professional Competencies. The relationship between the competencies in each Unit of Competence should be used to understand which behaviors are performed similarly as reported by the Program Managers. This has implications for curriculum developers, PM planners, and career managers in understanding how work is actually being performed by members of the career field.

Utilize a Competency-to-Training Matrix to Evaluate Course Learning Objectives

Evaluate Training Content for Coverage of the Highest Rated Units

An overall course evaluation should be conducted in order to ensure that Units of Competence seen as high in frequency and criticality are targeted in the PM training curriculum. The Units with the highest ratings are:

- Unit 4: Managing Programs and People
- Unit 2: Overseeing Contracting and Cost Estimating
- Unit 5: Process Management

In addition, courses should first be evaluated at Entry, Journey, and Senior Levels for the highest-rated competencies. This should include the competencies that are used the most and are most critical to the job of a program manager noted earlier in this summary.

Critically Analyze Competencies with Lower Frequency and Criticality Ratings

In general, we recommend that training evaluation and other human capital initiatives be focused on competencies that are highly rated in frequency and criticality. However, beyond looking at the highest rated competencies, it is also valuable to critically evaluate those competencies that were rated lowest.

This can help to account for instances when an area is low rated but is an agreed upon area of focus for the future. For example, competency 4.3 Software Reuse and competency 10.2 Produce Product are called out as two of the lowest rated competencies. Evaluating whether these particular competencies should be rated lowest is an appropriate next step with a panel of experts.

Important Targets for Training and Development include Competencies with Low Proficiency Ratings but High Frequency and Criticality Ratings

Differences in proficiency versus other ratings are an important consideration because those competencies that have lower proficiency ratings but relatively higher ratings in criticality and frequency are important targets for training and development efforts. The following two competencies have these differences in proficiency versus frequency and criticality:

- 9.1 Cost Estimating
- 1.5 Life-Cycle Cost Management

This suggests that, in general, Program Managers view these competencies as critical and frequent behaviors that are required to successfully perform the job. However, given that they also rate these low in proficiency, a closer review of training and development activities related to these two competencies should be focused in these areas.

Opportunities for Positive Change in Professional Competencies

Overall, PMs rated all the professional competencies very high across frequency and criticality. Professional competencies should be incorporated into most training and development activities because they cut across all technical activities of the job and underlie superior performance.

Comparing our current results versus our development (Phase II) results, we see some differences. Two competencies, although rated highly by the Subject Matter Experts (SMEs) in the development process are now on the lower end of ratings in the current Phase IV results. While still rated generally very high, those two competencies, Oral Communication and Influencing and Negotiating, were consistently rated lower in proficiency by the assessment respondents.

Training resources should be evaluated for coverage for these two additional competencies in addition to all of the highly-rated competencies.

Use Assignment Type and Major Service Component Information to Aid in Development, Evaluation and Future Career Planning of PMs

Characteristics of the job of program managers may impact each program manager's specific training needs. Therefore, when assigning, developing, and evaluating a PM, their Assignment Type and Major Service Component information should play an important role in the competencies required for superior performance.

Each Program Manager's job is impacted by their specific Assignment Type

Our demographic analysis shows that program managers see their work very differently depending upon the type of program in which they work. Each program manager's Assignment Type, either Weapons Systems, Business Management, Services, and International, impacts their job greatly, which is reflected in differences in how they rate frequency, criticality, and proficiency of each of the competencies. For example, for Unit 7: Technical Management Process there are significant differences between Weapons Systems (3.00) and Services (2.50).

Each Program Manager's job is impacted by their specific Major Service Component

In our analysis, we found significant differences in frequency, criticality, and proficiency across each of the Major Service Components. If indeed the job of a program manager varies from Service to Service, it would be critical to supplement DoD-wide training with

Service-specific training and development opportunities. Training and career development opportunities at each Service should be analyzed to see if they specifically address the requirement differences in their specific Service. For instance, in Unit 1: Information Management (IM), Information Technology (IT) And Software Management, those in the Fourth Estate(mean 3.17), perform activities related to Unit 1 more frequently that Air Force, Army, and Navy (2.43, 2.22, and 2.25 respectively).

Use Competencies for Creating Proficiency Standards, Developing Workforce Plans, Workforce Assessments, and Career Paths

The current gap analysis was carried out utilizing the employee's mean ratings in order to compare these ratings against the distribution in the sample. The results are displayed in a simple and straightforward manner that can also be used in future applications. It is intended as a first take on a possible future workforce diagnostic for use in human capital planning.

The proficiency standards can be used as a baseline proficiency standard for future studies looking at PM proficiency and gap analysis. In addition, these new standards can be used to look at large workforce planning issues in conjunction with demographic information.

Future steps should include revisiting the proficiency standards with a panel of experts in order to ensure that these standards are comparable to certification level and that they provide correct assumptions about expectations in the workforce. Utilizing these proficiency standards as a baseline for future analysis will prove to be a valuable workforce assessment tool. In the future it may advisable to choose specific competencies that the community is concerned about at specific career intervals (entry, journey, senior). Once these competencies are identified it would be useful to then look at how the PM community is arranged in terms of the distributions of gaps by career level, by service, or even down to the Major Command level.

Introduction

In the most recent Acquisition, Technology, and Logistics (AT&L) Human Capital Strategic Plan (v 3.0), the Defense Acquisition University (DAU) outlined the human capital agenda of competency development, assessment, and analysis to assist senior leaders in developing workforce strategies in order to improve certification, training, and development for the over 120,000-member AT&L workforce. To this end, DAU asked the Center for Naval Analyses (CNA) to develop Competency Models for each of the primary career fields within the AT&L workforce.

To develop these Competency Models, CNA has devised a four-phase Competency Development and Management Process. The final phase of our process entails a validation and workforce assessment. The validation of the Program Management (PM) Competency Model will allow for the use of the model for future training modifications, workforce measurements, and overall human capital strategic planning.

Competencies describe capabilities inherent to each person's job in process-oriented segments, allowing for easier comparisons across functions (Defense Acquisition University, 2005). Competencies define work requirements in units that can be reassigned, reallocated, and used with more flexibility. Employers can combine competencies across jobs and functions; they can even define company or agency-wide competencies that pertain to every employee within the organization (such as "providing superior customer service"). These cross-function or cross-organization competencies can clearly communicate what an organization values, provide recognition and rewards for employees who demonstrate those values. This communication of values provides a link to the goals of organizations, allowing for strategic management of an organization's human capital (Prahalad and Hamel, 1990; Shippmann et al., 2000).

Competency-based management depends on the ability of the community to collaborate in order to identify the competencies needed

each day on the job to perform successfully. Using a competency-based management system that is specific to the needs of the AT&L workforce will help organizations focus training dollars, reduce turnover costs, create shorter recruiting cycles, and build employee awareness about what the agency values in its people.

In this report, CNA documents the completion of the validation of the PM Competency Model, Phase IV of our Competency Model Management and Development process. Specifically, we do the following:

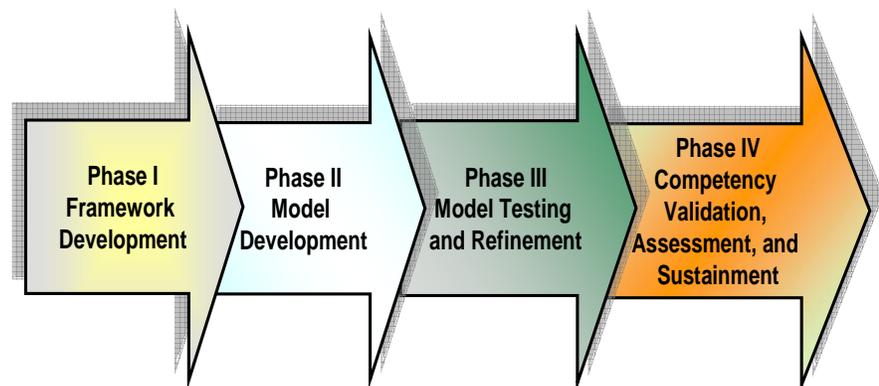
- **Validate the Competency Model** by testing the proposed Competency Model's applicability to the larger workforce through analysis of respondent competency ratings
- **Develop a data-based Competency Model structure** based on an analysis of respondent ratings.
- **Develop proficiency standards** for use in future applications and sustainment of the model.
- **Provide a gap analysis** at the competency level for Journey and Senior career-level respondents.

Methodology

Workforce assessments represent the next steps in realizing competency-based management strategies. A competency-based assessment of an organization's human capital is a critical component of maintaining and improving a workforce. A system of ongoing competency assessment empowers organizations to make informed human capital decisions, including decisions on effective training and development, selection, and incentive systems.

Competency Development Methodology

The current PM workforce Competency Model has undergone a development process guided by the Office of Personnel Management (OPM). This process is grounded in the research literature and has been proven successful in developing competency models in both private and public sectors (Lucia and Lepsinger, 1999; Shippmann et al., 2000; Marrelli, Tondora, and Hoge, 2005). The methodology consists of four phases:



Phase I, Framework Development: We convened an Expert Panel consisting of functional experts to review the existing competency framework as an entry point for this community. This framework, developed in a series of workshops prior to CNA involvement, consisted of ten Units of Competence. The experts developed a job framework of major functions, tasks, and skills required to perform the job, and they selected superior performers to participate in the next step as subject matter experts (SMEs). The framework was accepted for use to move into Phase II, Model Development.

Phase II, Model Development: We conducted and facilitated online structured interviews with selected SMEs in order to collect essential job data. These focus groups were used to collect comments and ratings on the competencies as they existed. The SMEs provided the data to identify key behaviors and refine the job framework developed by the Expert Panel. We collected both quantitative and qualitative data about the work performed by program managers. We asked the SMEs to tell us about both the technical and the professional competencies.

In addition, as part of our data collection, we asked each SME to describe a key situation or experience in which he/she felt particularly effective on the job. We also asked them to rate the professional competencies needed in that particular situation. SMEs gave consistently high ratings to the professional competencies, indicating that they had a significant impact on successful performance on the job.

CNA developed and formally reported on the Proposed Competency Model at the end of this phase. This Proposed Competency Model consisted of 78 competencies (68 technical, 10 professional) and 152 technical elements. After the Proposed Competency Model report was delivered at the conclusion of Phase II in October, 2007, the next step was to facilitate a review of the Model in Phase III. Please see Appendix E, Phase II to Phase III Revision Process for details on the changes made.

Phase III, Model Testing and Refinement: We conducted a model review with DAU functional experts, representatives from Major Service Components, and CNA analysts. This review was intended to refine the model for use in the assessment. Operationally, this meant reducing the number of elements in the competency model

to the most important and basic elements. During the review, the Proposed Competency Model was refined to a model with 45 competencies (35 technical, 10 professional) and 45 technical elements.

This step helped to ensure that stakeholders from Major Service Components could review and approve the model for use in the assessment. This step provides an additional validation check on each element and competency as it rolls forward to Phase IV. Please see the technical competency portion of the model in Appendix A and the professional competency portion in Appendix B. The resulting Competency Model from this process was utilized and then finalized in Phase IV, Competency Validation, Assessment, and Sustainment.

Phase IV, Competency Validation, Assessment, and Sustainment: We further validate the competency model and at the same time perform a workforce assessment with a stratified sample of the workforce.

Pre-Assessment Activities

Preparation of the Workforce for the Assessment with Communications

We worked with DAU's Acquisition Workforce and Career Management (AWCM) Office and PM Functional Integrated Process Team (FIPT) leadership to draft and refine communication materials to be sent out prior to launch. These materials included web site information, an invitation, a reminder message, and a formal senior leadership introductory message.

A critical success factor of all competency management processes is the communication of the effort to leadership and the PM community at large. In coordination with the project team, Mr. David G. Ahern, Director, Portfolio Systems Acquisition, and Mr. Frank Anderson, President of DAU, crafted a joint memo that detailed their support for the current effort. They stressed the importance and use of the assessment and they let the workforce know about their potential participation in the assessment and validation effort.

We Conducted a Random Sample Selection

We identified a randomly selected 4,271-person sample from the existing DAU source file of over 10,320 people who were identified as having PM certification and sitting in a PM-coded position by each Major Service Component.

We then created a stratified random sample and invited 4,271 members from the Major Service Components to take part in the assessment. The number invited from each Component is related to the level at which they exist in the population at large. For instance, because the Army makes up a larger percentage of the PM population at large, a larger number of participants were invited specifically from Army. See Table 1 for details as to the numbers invited to take part from each Service.

Table 1. PM Sample Stratification

Component	PM Population 2007	Number Selected Randomly	Total Number of E-mail Addresses Made Available
Army	4,473	1,420	4,700
Navy	3,627	1,384	3,757
Air Force	3,958	1,404	1,800
Fourth Estate	717	63*	63*
Total	12,775	4,271	10,320

* Because only 63 e-mails were available for Fourth Estate, we did not conduct a random sample but rather we sent e-mails to all identified Fourth Estate members.

Participation

We e-mailed an invitation from CNA's Competency Assessment (COMPASS) website to each of the randomly selected 4,271 participants in two waves over a period of about 1 month. On average, it took between 35 and 45 minutes for each person to complete the assessment.

A total of 1,750 respondents entered the website. A total of 182 respondents were removed because they did not provide enough useful information for analysis. Therefore, of the 4,271 program managers invited, 1,568 completed the assessment for a total response rate of 36.7 percent.

We did not achieve enough supervisor assessment results to include their ratings in the gap analysis in the Workforce Gap Assessment Section.

Major Service Components

In the current sample, we had very good participation from each Major Service Component. As detailed in Table 2, of 1,568 total respondents, there were 550 (35.1 percent) Air Force, 514 (32.8 percent) Army, 461 (29.4 percent) Navy, and 29 (1.8 percent) Fourth Estate.

Table 2. Major Service Component

Component	Frequency	Percent
Air Force	550	35.1
Army	514	32.8
Navy	461	29.4
Fourth Estate	29	1.8
Other	7	0.4
Missing	7	0.4
Total*	1,568	100.0

* The Component information was missing for a large portion of the sample, so e-mail address suffixes (navy.mil, army.mil, etc.) were used to recode their Component affiliations.

Military/Civilian Status

Overall, a majority of our sample members are civilian (1,058, or 67.5 percent), whereas 483 (30.8 percent) are active military, and four (0.3 percent) are Reserve members (see Table 3). This is important when looking at how the PM workforce is staffed when faced with workforce shortages and replacement of separated workforce members.

Table 3. Military versus Civilian Personnel

Employment Status	Frequency	Percent
Civilian	1058	67.5
Military	483	30.8
Reserve	4	0.3
Missing	23	1.5
Total	1568	100.0

DAWIA Certification Level

DAWIA certification level is displayed in Table 4. Overall, the largest certification group in our sample is Level III, with 1,004 (64.0).

Table 4. DAWIA Certification Level

Certification Level	Frequency	Percent
Level III Certification	1,004	64.0
Level II Certification	404	25.8
Level I Certification	104	6.6
No Certification	33	2.1
Missing	23	1.5
Total	1,568	100.0

Grade/Equivalent Rank

We had good representation from across the workforce according to our grade/equivalent rank results (Table 5). To begin to look at this data we grouped each grade/equivalent rank as to approximate career level. Because we did not have enough supervisors to designate our respondents into career levels, we use grade/equivalent rank as a proxy.

Overall, we had a small number from the Entry-level group with 30 (1.9 percent), high levels of representation from Journey-level 626 (39.9 percent), and 889 (56.7 percent) Senior-level practitioners.

Table 5. Grade/Equivalent Rank Breakdown

Grade/Equivalent Rank	Frequency	Percent
<i>Entry-level grade/rank</i>	30	1.9
GS-7	1	0.1
GS-9	9	.6
O2	18	1.1
W2	1	0.1
W3	1	0.1
<i>Journey-level grade/rank</i>	626	39.9
W4	1	0.1
W5	1	0.1
E6	1	0.1
GS-11	17	1.1
GS-12	88	5.6
GS-13	433	27.6
O3	85	5.4
<i>Senior-level grade/rank group</i>	889	56.7
GS-14	272	17.3
GS-15	234	14.9
E7	2	0.1
E8	4	.3
E9	2	0.1
O4	162	10.3
O5	141	9.0
O6	61	3.9
O7	5	0.3
O9	1	0.1
SES1, SES2, SES4	5	0.3
<i>Missing</i>	23	1.5
Total	1,568	100.0

ACAT Level

We had good representation across Acquisition Category (ACAT) levels (Table 6). The largest grouping of our respondents was the 417 ACAT level I respondents, the most complex and expensive programs, making up 26.6 percent of our sample.

Table 6. ACAT Level Breakdown

ACAT Level of Current Program	Frequency	Percentage
Level I	417	26.6
Level IA	74	4.7
Level II	149	9.5
Level III	308	19.6
Pre-ACAT Technology Project	71	4.5
Other	238	15.2
Not Applicable	288	18.4
Missing	23	1.5
Total	1,568	100.0

An additional look at this information is a breakdown of ACAT level versus our grouping of grade as seen in the grade/equivalent rank breakdown (Table 7). For this comparison, we used the career level breakdown based on grade information: Entry (GS-7–GS-9, O2s, W2–W3), Journey (E6, GS-11–GS-13, O3, W4), and Senior (E7–E9, GS-14–GS-15, SES1–SES5, O4–O9).

Table 7. ACAT Level Versus Career Level

ACAT Level	Entry	Journey	Senior	Total
ACAT I	7	129	281	417
ACAT IA	1	27	46	74
ACAT II	1	56	92	149
ACAT III	2	136	170	308
Not applicable	12	125	151	288
Other	7	124	107	238
Pre-ACAT Technology Project	0	29	42	71
Total	30	626	889	1,545

Job Title

The current sample has a wide diversity of job titles that cut across the PM community as a whole, as seen in Table 8. Respondents were asked to classify their job titles into the following classifications: (1) Program Management Office (PMO) Staff, (2) Program Executive Office (PEO) Staff, (3) PM or Equivalent, (4) PMO Section Head, (5) DoD Agency Activity Staff Billet, (6) Deputy Program/Project Manager (DPM) or equivalent, (7) Integrated Process Team (IPT) Leader, (8) DoD Agency Activity Staff Billet, and (9) Other.

Those who selected “Other” were also allowed to type an additional field. Analysts worked to reclassify over 300 additional job titles provided by respondents into the existing categories. As a result of this analysis, three additional categories were created for this job title characterization: Program Analysts, Logistics Management Specialists, and Engineers. Of the current sample, 394 (25.1 percent) are “PM or equivalent,” 205 (13.1 percent) are “DPM or equivalent,” 188 (12.0 percent) are “PMO Staff,” and 182 (11.6 percent) are “IPT Leader”.

Table 8. Job Title

Job Title Grouping	Frequency	Percent
PM or equivalent	394	25.1
DPM or equivalent	205	13.1
PMO Staff	188	12.0
IPT Leader	182	11.6
PMO Section Head	128	8.2
DoD Agency Activity Staff Billet	102	6.5
PEO Staff	84	5.4
Program Analyst	62	4.0
DoD Agency Activity Staff Billet	55	3.5
Engineer (All types)	29	1.8
Logistics Management Specialist	9	0.6
Other	68	4.3
Missing	62	4.0
Total	1,568	100.0

Assignment Type

We had good representation across different types of assignments (Table 9). Of our respondents, 955 (60.9 percent) were involved in Weapons Systems, 323 (20.6 percent) were involved in Business Management programs, 207 (13.2 percent) were involved in Service programs and 60(3.8 percent) were involved in International PM assignments.

Table 9. Assignment Type

Assignment Type	Frequency	Percent
Weapons Systems	955	60.9
Business Management	323	20.6
Services	207	13.2
International	60	3.8
Missing	23	1.5
Total	1,568	100.0

Years of PM Experience

Looking at years of PM experience (Table 10), 436 (27.8 percent) have 0 to 5 years of PM experience, and 390 (24.9 percent) have 6 to 10 years of PM experience. In addition, 216 (13.8 percent) have 11 to 15 years of PM experience, 195 (12.4 percent) have 16 to 20 years of PM experience, and 308 (19.6 percent) have 21 plus years of PM experience. The average years of PM experience in our sample was 12.3 years.

Table 10. Years of PM Experience

Years of PM Experience	Frequency	Percent
0 to 5 Years	436	27.8
6 to 10 Years	390	24.9
11 to 15 Years	216	13.8
16 to 20 Years	195	12.4
21 Plus Years	308	19.6
Missing	23	1.5
Total	1,568	100.0
Years of PM Experience Average	12.3	

Years of Acquisition Experience

Looking at years of Acquisition experience in Table 11, we see that we have a spread across the years of Acquisition Experience. Overall the two largest groupings are (360 (23.0 percent) with 6 to 10 years of Acquisition experience and 357 (22.8 percent) with 21 plus years of Acquisition experience. The average years of Acquisition experience in our sample was 14.0 years.

Table 11. Years of Acquisition Experience

Years of Acquisition Experience	Frequency	Percent
0 to 5 Years	289	18.4
6 to 10 Years	360	23.0
11 to 15 Years	258	16.5
16 to 20 Years	281	17.9
21 Plus Years	357	22.8
Missing	23	1.5
Total	1,568	100.0
Average Years Acquisition Experience	14.0	

Retirement Plan

Respondents were asked to provide information on their government retirement plan. Government employees can be in either the Civil Service Retirement System (CSRS) or the Federal Employees Retirement System (FERS). Currently, new federal employees can only choose to enroll in the FERS plan because the CSRS plan is being phased out. Thus, those personnel under the CSRS plan have more years in government service than those under the FERS plan.

As shown in Table 12, the largest grouping are those who have FERS 815 (52.0 percent), with lesser numbers of CSRS and Not Applicable/No Retirement Plan/ Other Retirement Plan.

Table 12. Retirement Plan

Retirement Plan	Frequency	Percent
CSRS	315	20.1
FERS	815	52.0
Not Applicable / No Retirement Plan / Other Retirement Plan	292	18.6
Not Sure	123	7.8
Missing	23	1.5
Total	1,568	100.0

Years Until Retirement

We had good representation from across the workforce according to our grade/equivalent rank results (Table 13). As shown in Table 13, 551 (35.1 percent) have 1 to 5 years until retirement, while 482 (30.1 percent) have 6 to 10 years until retirement.

Table 13. Years Until Retirement

Years Until Retirement	Frequency	Percent
1 to 5 Years	551	35.1
6 to 10 Years	482	30.7
11 to 15 Years	407	26.0
16 to 20 Years	105	6.7
Missing	23	1.5
Total	1,568	100.0
Average Years Until Retirement	9.8	

Job Mobility Item

We also included an item dealing with job mobility as our participants move along in their careers (see Table 14). For the statement, “I intend to continue working in my current organization until I retire,” we grouped the “Strongly Agree” and “Tend to Agree” responses together to show that 45.4 percent of the workforce intends to stay at their current organizations. In contrast, combining both “Disagree” and “Tend to Disagree,” 35.3 percent do not intend to stay at their organizations.

Table 14. Job Mobility Item

Rating	Frequency	Percent
1-Strongly Disagree	343	21.9
2-Tend to Disagree	210	13.4
3-Hard to Decide	280	17.9
4-Tend to Agree	383	24.4
5-Strongly Agree	329	21.0
Missing	23	1.5
Total	1,568	100.0

Applicability of Our Sample to the PM Population

It is important to compare our sample with that of the larger PM population. We believe our numbers to be comparable to those of the PM workforce at large. We used FY 2007 DAU as our comparison group for population comparisons. For this report, we have access to a large amount of information about the population, and for that reason can make meaningful connections between our sample and the population at large.

When comparing our sample's Major Service Component information with that of FY 2007 DAU component information, we see many similarities (See Tables 15 and 16). All Major Service Components workforce percentages show similarities in the sample versus the PM population at large in FY 2007. For Air Force representation, there was 31.7 percent in FY 2007 compared with the sample's 35.1 percent, as well as comparable numbers in Army (33.1 percent in FY 2007 versus the sample's 32.8 percent), Navy (29.8 percent in FY 2007 versus the sample's 29.4 percent), and Fourth Estate (5.4 percent in FY 2007 versus the sample's 1.8 percent).

Table 15. Major Service Component Comparison FY 2007 versus Sample

Major Service Component	FY 2007 Percent	Sample Percent
Air Force	31.7	35.1
Army	33.1	32.8
Navy (including USMC)	29.8	29.4
Fourth Estate (DCMA, DLA, Other)	5.4	1.8
Other	N/A	0.4
Missing/Left Blank	N/A	0.4
Total	100.0	100.0

When comparing military/civilian status information with that of FY 2007 data, we see additional similarities. Overall, a majority of the members of our sample, 67.5 percent, are civilian versus 31.1 percent active military. In FY 2007, the numbers were comparable: 64.0 percent civilian versus 36.0 percent military.

Table 16. Military/Civilian Status Comparison FY 2007 versus Sample

Employment Status	FY 2007 Percentage	Sample Percentage
Civilian	64.0	67.5
Military / Reserve Combined	36.0	31.1
Missing	N/A	1.5
Total	100.0	100.1*

In addition, our sample matches the PM population figures provided by DAU. Our current results show that 18.4 percent of our sample has between 0 and 5 years of acquisition experience. A comparable figure from DAU’s FY 2007 PM statistics is the 17.0 “Percentage of PM workforce with less than 5 years of service.” (See Table 17).

Table 17. FY 2007 Experience Comparison with Sample

Comparable Items – Showing Workforce Comparisons	
Percentage of PM workforce with less than 5 years of service (FY 2007)	Percentage with 0 to 5 Years’ Acquisition experience (Current Report)
17.0	18.4

Additional Evidence

In addition to these three comparisons, our spread of years of PM experience, diversity of job titles, diversity of grade/equivalent rank, type of program, and overall size of our sample lends credence to our use of the current sample.

Program Management Workforce Competency Assessment/Validation Results

Validation of the Competency Model

Establishing that the competencies in the PM Competency Model are related to the job of a program manager is the goal of this validation portion of the assessment report. We do this by using the results from our stratified random sample assessment. We ask each randomly selected participant a standardized set of questions to fully investigate our PM Competency Model.

In addition in this portion of the report, we establish a data-based Competency Model structure and look at how this structure is related to the job of a program manager, as well as the relative importance of the uncovered Units of Competence and the individual technical and professional competencies.

Competency Rating Details for Technical Competencies

The survey begins by asking each respondent for demographic information and then leads to the more detailed technical competency items. Each employee is asked to rate frequency, criticality, and their own proficiency, using the scales detailed in Figure 1 for each of the behaviors described in the 45 technical elements.

Figure 1. Competency Ratings for Technical Competencies

Competency 1.1: Requirements Process (Pre-Project/Pre-Program)	
Element 1. Evaluate, relative to capability gaps, materiel/non-materiel concepts to develop a program definition.	
Frequency - How often do you do this activity in your job?	
• 1	1 - Almost Never
• 2	2 - Rarely
• 3	3 - Occasionally
• 4	4 - Frequently
• 5	5 - Very Frequently
• NA	N/A - Not Applicable / Not needed in my job
Criticality - How critical is this activity in your job?	
• 1	1 - Not Critical
• 2	2 - Somewhat Critical
• 3	3 - Fairly Critical
• 4	4 - Very Critical
• 5	5 - Extremely Critical
• NA	NA - Not Applicable / Not needed in my job
Proficiency - Rate how proficient you are at the competency element behaviors.	
• 0	<i>No exposure to, or awareness of</i> , this element
• 1	Awareness: Applies the competency in the simplest situations and requires close and extensive guidance
• 2	Basic: Applies the knowledge area or skill in somewhat complex situations
• 3	Intermediate: Applies the knowledge area or skill in complex situations
• 4	Advanced: Applies the knowledge area or skill in considerably complex situations
• 5	Expert: Applies the knowledge area in exceptionally complex situations

Limited Use of Supervisor’s Input in Assessment

In addition to employee responses, we also sought the point of view of supervisors in assessing each respondent’s proficiency for each competency element. This multi-rater feedback would have provided additional support and validation for the self-report data we had already collected. However, we did not achieve enough supervisor assessment results to include this group in our analysis of criticality and proficiency of individuals. Instead, the current assessment results will focus primarily on validation of the PM Competency Model, which does not require supervisor input.

Competency Validation Findings

Three Competencies Stand Out as the Most Frequently Used

Our participants rated each element on a five-point Likert scale for Frequency (Frequency - How often do you do this activity in your job? 1 - Almost Never; 2 - Rarely; 3 - Occasionally; 4 - Frequently, 5 - Very Frequently, NA - Not Applicable/Not Needed). As noted in Table 18, the competencies that our sample performed most frequently are the following:

- 1.8 Working Groups and Teams
- 1.6 Risk and Opportunity Management
- 1.2 Concept Selection Process (Pre-Project/Pre-Program); Technology Development Strategy.

Table 18. Frequency Ratings at the Competency Level

Competency	N	Mean	SD
1.8 Working Groups and Teams	1,291	4.09	1.11
1.6 Risk and Opportunity Management	1,281	3.54	1.17
1.2 Concept Selection Process (Pre-Project /Pre-Program); Technology Development Strategy	1,389	3.37	1.19

Four Competencies Are Viewed as the Most Critical Competencies

Our participants rated each element on a five-point Likert scale for Criticality (Criticality - How critical is this activity in your job? 1 - Not Critical, 2 - Somewhat Critical, 3 - Fairly Critical, 4 - Very Critical, 5 - Extremely Critical, NA - Not Applicable/Not Needed). As noted in Table 19, the competencies believed to be most critical are the following:

- 1.8 Working Groups and Teams
- 1.6 Risk and Opportunity Management
- 8.3 Prepare and Issue Solicitation
- 8.2 Prepare Requirements & Support Documentation.

Table 19. Criticality Ratings at the Competency Level

Competency	N	Mean	SD
1.8 Working Groups and Teams	1,288	3.93	1.13
1.6 Risk and Opportunity Management	1,279	3.47	1.18
8.3 Prepare and Issue Solicitation	1,143	3.38	1.28
8.2 Prepare Requirements & Support Documentation	1,144	3.36	1.31

Four Competencies Have the Highest Proficiency Ratings

Our participants rated each element on a 5-point Likert scale for Proficiency (Proficiency - Rate how proficient you are at the competency element behaviors: 0 - No exposure to, or awareness of, this element; 1 - Awareness; 2 - Basic; 3 - Intermediate; 4 - Advanced; 5 - Expert) (see Table 20). The competencies seen by our respondents as those with performed with the highest proficiency are the following:

- 1.8 Working Groups and Teams
- 1.6 Risk and Opportunity Management
- 1.2 Concept Selection Process (Pre-Project/Pre-Program); Technology Development Strategy
- 8.3 Prepare and Issue Solicitation.

Table 20. Proficiency Ratings at the Competency Level

Competency	N	Mean	SD
1.8 Working Groups and Teams	1,303	3.70	1.01
1.6 Risk and Opportunity Management	1,302	3.22	1.08
1.2 Concept Selection Process (Pre-Project/Pre-Program); Technology Development Strategy	1,424	3.17	1.11
8.3 Prepare and Issue Solicitation	1,210	3.15	1.16

Overall Look at Ratings

Five Competencies Had the Highest Ratings Across Frequency, Criticality, and Proficiency Ratings

There was a large amount of similarity in ratings of frequency, criticality, and proficiency, which demonstrates that the competencies identified in this grouping are truly an integral part of the job (Ta-

ble 21). Those competencies that are used the most, are most critical to their job, and are believed to be the competencies in which the participants perform with the highest proficiency are the following:

- 1.8 Working Groups and Teams
- 1.6 Risk and Opportunity Management
- 1.2 Concept Selection Process (Pre-Project/Pre-Program); Technology Development Strategy
- 8.3 Prepare and Issue Solicitation
- 8.2 Prepare Requirements & Support Documentation.

Table 21. Highest Ratings Across Frequency, Criticality and Proficiency

Competency	Frequency Mean	Criticality Mean	Proficiency Mean
1.8 Working Groups and Teams	4.09	3.93	3.70
1.6 Risk and Opportunity Management	3.54	3.47	3.22
1.2 Concept Selection Process (Pre-Project/Pre-Program); Technology Development Strategy	3.37	3.24	3.17
8.3 Prepare and Issue Solicitation	3.12	3.38	3.15
8.2 Prepare Requirements & Support Documentation	3.10	3.36	3.07

A Positive Workforce Indicator

This indicates a large degree of correlation in those competencies that are needed most, used most, and enacted proficiently. Therefore, according to these analyses, we see a positive indicator of workforce capability in that the workforce members are proficient in the skills that are most critical and most frequently used in their jobs most.

Important Targets for Training and Development include Competencies with Low Proficiency Ratings but High Ratings in Frequency and Criticality

Lastly, we looked at those competencies with low ratings on proficiency but high ratings in frequency and criticality (see Table 22). This is an important consideration because those competencies that

have a lower proficiency rating but relatively high ratings in criticality and frequency may be important targets for training and development efforts.

If these competencies are needed frequently and are highly critical, but our workforce has limited proficiency, this is an important component of our analysis. The two competencies with high frequency and criticality but relatively lower proficiency are:

- 9.1 Cost Estimating
- 1.5 Life-Cycle Cost Management

Table 22. Low Proficiency But High Criticality and Frequency

Competency	Frequency Mean	Criticality Mean	Proficiency Mean
9.1 Cost Estimating	2.95	3.19	2.80
1.5 Life-Cycle Cost Management	2.93	3.09	2.77

Three Competencies Had Low Ratings Across All Variables

We also looked at those competencies with low ratings on frequency, criticality, and proficiency (Table 23). The competencies that are used the least, are least critical to their job, and are believed to be the competencies where they perform with the lowest proficiency are:

- 9.2 Department/Agency Programming, Planning and Budgeting Type System¹
- 4.3 Software Reuse
- 10.2 Produce Product

¹ This competency element references the Program Assessment Rating Tool (PART) which is not commonly used by all PMs and may have thrown off the ratings for this particular competency

Table 23. Low Ratings on Three Competencies

Competency	Frequency Mean	Criticality Mean	Proficiency Mean
9.2 Department/Agency Programming, Planning and Budgeting Type System	1.86	2.24	2.02
4.3 Software Reuse	2.07	2.31	2.19
10.2 Produce Product	2.04	2.34	2.30

Exploratory Factor Analysis Findings

Analysis Revealed a Nine-Unit Structure

As part of our validation process we created a Competency Model structure which can be used to assess the workforce in later competency management applications. We conducted a factor analysis, a data reduction technique commonly used to uncover the underlying structure of a set of inter-related variables, in order to better understand the underlying structure of our competencies. Past studies have documented the use of factor analysis in developing Competency Model structure (Boyatzis, 1999, Bartram and Brown, 2005, Hausmann and Tregar, 2006).

The factor analysis shows those competencies whose ratings are highly correlated with each other. For example, we can see for Unit 4: Managing Programs and People. PMs who rate competency 1.8 Working Groups and Teams highly also rate 1.6 Risk and Opportunity management highly frequent. The relationship between the competencies in each Unit of Competence should be used to understand which behaviors are performed similarly as reported by the Program Manager's. This has implications for curriculum developers, PM planners, and career managers in understanding how work is actually being performed by members of the career field.

Competency Model Structure: Our analysis revealed a structure with nine Units of Competence (see Figure 2):

- **Unit 1: Information Management (IM), Information Technology (IT), and Software Management**

- **Unit 2: Overseeing Contracting and Cost Estimating**
- **Unit 3: Life-Cycle Planning and Production**
- **Unit 4: Managing Programs and People**
- **Unit 5: Process Management**
- **Unit 6: Life-Cycle Budgeting and Financial Planning**
- **Unit 7: Technical Management Process**
- **Unit 8: Identify and Protect Technologies**
- **Unit 9: International/Joint/Inter-Agency Program Management**

In addition to the nine Units of Competence encapsulating all the technical competencies, we placed the professional competencies in a separate tenth Unit of Competence called: **PM Professional Competencies**. When creating an assessment that attempts to measure multiple dimensions, one should use a measure that contains items that exemplify the intended dimension and distinguish one Unit from another (Hausmann, 2004). If we were to create a performance measure using these results, these new Units would form its basis. The resulting structure is very similar to that of the Phase II Proposed Competency Model structure. See Appendix F for a map of the old Topics to the new Units.

Figure 2. Exploratory Factor Analysis Results

Unit 1: Information Management (IM), Information Technology (IT), and Software Management	Unit 2: Overseeing the Contracting Process	Unit 3: Life Cycle Planning and Production	Unit 4: Baseline Management	Unit 5: Process Management
4.2 Software Development	8.2 Prepare Requirements & Support Documentation	10.1 Plan/Readiness for Production	1.8 Working Groups and Teams	1.1 Requirements Process (Pre-Project/Pre-Program)
4.1 Software Quality	8.5 Award and Administer Contract	6.2 Readiness for Initial Operational T&E (IOT&E); system suitability	1.6 Risk and Opportunity Management	1.2 Concept Selection Process (Pre-Project/Pre-Program); Technology Development Strategy
4.3 Software Reuse	8.3 Prepare and Issue Solicitation	10.2 Produce Product	2.1 Configuration Management	1.3 Technology Development Process (Pre-Project/Pre-Program)
2.4 IM/IT Architecture	8.4 Perform Source Selection	7.1 Lifecycle Logistic (LCL) Management, Product Support Interoperability and Materiel & Supply Chain Management	1.4 Core Management Skills and Processes	5.1 Program Considerations
2.5 System Integration	8.6 Performance-based Service Agreements	6.1 T&E Strategy (TES), Master Plan & TEMP	2.2 Data Management	
2.6 Systems Life-Cycle	8.1 Contract Approach	7.2 Lifecycle Cost Optimization, Data Management and System Responsiveness		
2.3 Information Systems/Network Security/Information Assurance	9.1 Cost Estimating			
Unit 6: Life-Cycle Budgeting and Financial Planning	Unit 7: Technical Management Process	Unit 8: Identify and Protect Technologies	Unit 9: International/ Joint/Inter-Agency Program Management	Unit 10: PM Professional Competencies*
9.2 Dept/Agency Programming, Planning and Budgeting Type System	3.2 Technical Process	5.2 Identify and Protect Technologies	1.7 Joint/ Inter-Agency/ International Program Management	(*This Additional Unit of Competence was not part of the Factor Analysis results)
1..5 Life-Cycle Cost Management	3.1 Technical Management Process			
<p>Key</p>  <p>Border shading denotes a competency that is highly correlated with more than one Unit and may be considered for removal for this specific Unit of Competencies</p>				

Unit of Competence Level Analysis

Unit 4 Is Rated the Highest in Frequency at the Unit Level

Looking at frequency ratings for each Unit, we found that Unit 4: Managing Programs and People, was performed at a distinctly higher frequency level compared to the other Units (Table 24). Unit 5: Process Management, is the next highest rated Unit of Competence, followed by Unit 2: Overseeing the Contracting Process and Unit 7: Technical Management Process.

Table 24. Frequency Ratings at the Unit Level

Unit of Competence	N	Mean	SD
Unit 4: Managing Programs and People	1067	3.36	0.85
Unit 5: Process Management	986	3.01	0.87
Unit 2: Overseeing the Contracting Process	966	2.89	1.00
Unit 7: Technical Management Process	1047	2.87	1.05
Unit 8: Identify and Protect Technologies	1057	2.52	1.24
Unit 3: Life Cycle Planning and Production	836	2.45	0.91
Unit 6: Life-Cycle Budgeting and Financial Planning	933	2.41	1.05
Unit 9: International/Joint/Inter-Agency Program Management	1123	2.39	1.41
Unit 1: Information Management (IM), Information Technology (IT) And Software Management	891	2.32	0.98

Unit 4 Is Rated the Highest in Criticality at the Unit Level

Unit 4: Managing Programs, was seen as a distinctly more critical level when compared to the other Units (Table 25). Unit 2: Overseeing the Contracting Process is the next highest in criticality, with a large drop off in ratings following that Unit.

Table 25. Criticality Ratings by Unit

Unit of Competence	N	Mean	SD
Unit 4: Managing Programs and People	1054	3.37	0.91
Unit 2: Overseeing the Contracting Process	951	3.19	1.09
Unit 5: Process Management	962	3.05	0.94
Unit 7: Technical Management Process	1039	3.04	1.11
Unit 8: Identify and Protect Technologies	1048	2.83	1.36
Unit 3: Life Cycle Planning and Production	811	2.74	1.07
Unit 6: Life-Cycle Budgeting and Financial Planning	911	2.67	1.14
Unit 1: Information Management (IM), Information Technology (IT) And Software Management	875	2.58	1.11
Unit 9: International/Joint/Inter-Agency Program Management	1096	2.36	1.40

Unit 4 Is Rated the Highest in Proficiency at the Unit Level

Unit 4: Managing Programs and People is the Unit of Competence where individuals saw themselves as having the highest proficiency level (as seen in Table 24). Unit 5: Process Management, is the next highest in proficiency followed by Unit 2: Overseeing the Contracting Process, with a large drop off after that Unit.

Table 26. Proficiency Ratings By Unit

Unit of Competence	N	Mean	SD
Unit 4: Managing Programs and People	1142	3.25	0.81
Unit 5: Process Management	1014	3.09	0.89
Unit 2: Overseeing the Contracting Process	1075	3.04	0.96
Unit 7: Technical Management Process	1076	2.89	0.99
Unit 3: Life Cycle Planning and Production	877	2.77	0.85
Unit 9: International/Joint/Inter-Agency Program Management	1097	2.54	1.23
Unit 1: Information Management (IM), Information Technology (IT) And Software Management	867	2.52	0.90
Unit 6: Life-Cycle Budgeting and Financial Planning	909	2.49	0.93
Unit 8: Identify and Protect Technologies	1118	2.40	1.13

Overall Look at the Units

We see many parallels across frequency, criticality, and proficiency ratings. This means that those competencies that are performed often and are highly critical, like Unit 4: Managing Programs and People, Unit 2: Overseeing the Contracting Process, and Unit 5: Process Management are also those that have higher proficiency.

Unit 8: Identify and Protect Technologies, has a relatively lower proficiency (2.40) as compared to its frequency and criticality average of 2.67.

Table 27. Unit Ratings for Frequency, Criticality, Proficiency

Unit of Competence	Frequency	Criticality	Proficiency	Average Frequency & Criticality
Unit 4: Managing Programs and People	3.36	3.37	3.25	3.36
Unit 2: Overseeing the Contracting Process	2.89	3.19	3.04	3.04
Unit 5: Process Management	3.01	3.05	3.09	3.03
Unit 7: Technical Management Process	2.87	3.04	2.89	2.95
Unit 8: Identify and Protect Technologies	2.52	2.83	2.40	2.67
Unit 3: Life Cycle Planning and Production	2.45	2.74	2.77	2.60
Unit 6: Life-Cycle Budgeting and Financial Planning	2.41	2.67	2.49	2.54
Unit 9: International/Joint/Inter-Agency Program Management	2.39	2.54	2.36	2.47
Unit 1: Information Management (IM), Information Technology (IT) And Software Management	2.32	2.58	2.52	2.45

Professional Competency Findings

Methodology for the Current Assessment of Professional Competencies

Following the conclusion of the technical competency portion, each participant was asked to rate each of the professional competencies as to frequency of use, criticality, and proficiency level. Professional competencies provide a necessary counterbalance to technical competencies in that these competencies may underlie superior performance versus technical proficiency in specific subject matter. See Figure 3 for each rating scale for each type of rating.

Figure 3. Display of Question and Rating Scale

<p>Problem Solving: Identifies and analyzes problems; weighs relevance and accuracy of information; generates and evaluates alternative solutions; makes recommendations. Examples:</p> <ul style="list-style-type: none"> • Makes clear and convincing oral presentations. Listens effectively; clarifies information as needed. • Personally disseminate information to all relevant parties to maintain consistency of message. 	
Frequency - How often do you do this skill in your job?	
• 1	1 - Almost Never
• 2	2 - Rarely
• 3	3 - Occasionally
• 4	4 - Frequently
• 5	5 - Very Frequently
• NA	N/A - Not Applicable / Not needed in my job
Criticality - How critical is this activity in your job?	
• 1	1 - Not Critical
• 2	2 - Somewhat Critical
• 3	3 - Fairly Critical
• 4	4 - Very Critical
• 5	5 - Extremely Critical
• NA	NA - Not Applicable / Not needed in my job
Proficiency - How proficient are you in utilizing this skill to be effective on your job?	
• 1	Awareness: Applies the competency in the simplest situations and requires close and extensive guidance
• 2	Basic: Applies the competency in somewhat difficult situations and requires frequent guidance
• 3	Intermediate: Applies the competency in difficult situations and requires little or no guidance
• 4	Advanced: Applies the competency in considerably difficult situations and generally requires no guidance
• 5	Expert: Applies the competency in exceptionally difficult situations and involves serving as a key resource and advises others
• N/A	Not Applicable / Not needed in my job

Current Analysis Works From Development Results From Phase II

Each participant was presented with each of the top ten professional competencies identified in the development process (Phase II). During Competency Model development, our SMEs identified the top professional competencies that they believed are the so-called “difference-makers”. As seen in Figure 4, Oral Communication, Team Building, and Flexibility were the top-rated professional competencies our SMEs noted as being needed for effective performance in our development process in Phase II. The current analysis takes the next step; to now look to the levels that exist in the workforce for these specific and critical professional competencies, detailed in the following section.

Figure 4. Top-Rated Professional Competencies in the Development Process

- 1. Oral Communication**
- 2. Team Building**
- 3. Flexibility**
- 4. Influencing and Negotiating**
- 5. Interpersonal Skills**
- 6. Decisiveness**
- 7. Partnering**
- 8. Resilience**
- 9. Problem Solving**
- 10. Accountability**

Current Analysis of Professional Competency Results

Analysis revealed many parallels across the frequency, criticality, and proficiency ratings in our respondents. A positive result is that this shows that our workforce members feel most confident in their abilities in those areas that they use the most and are most critical to their jobs. As we know, the job of a Program Manager involves working with teams and gaining information from multiple sources in order to make proper program or project decisions to meet project requirements through the planning, executing, monitoring, and controlling (Project Management Institute, 2004). The professional competencies found to be most proficient reflect the skills needed for this type of planned execution through people.

Frequency Comparisons of Professional Competencies

As seen in Table 28, the competencies our respondents perform most are demonstrated in frequency ratings findings. The top five professional competencies according to frequency ratings are:

- Interpersonal Skills
- Team Building
- Accountability
- Flexibility
- Problem Solving

Table 28. Professional Competency Ratings: Frequency

Competency	N	Mean	SD
Interpersonal Skills	1,256	4.63	0.58
Team Building	1,252	4.36	0.83
Accountability	1,251	4.32	0.77
Flexibility	1,253	4.29	0.78
Problem Solving	1,251	4.25	0.79
Oral Communication	1,250	4.17	0.97
Decisiveness	1,253	4.16	0.80
Resilience	1,254	4.13	0.82
Influencing and Negotiating	1,243	4.10	0.89
Partnering	1,246	4.01	0.88

Criticality Comparisons of Professional Competencies

Table 29 shows the competencies our respondents see as most critical. The top five professional competencies according to criticality are:

- Interpersonal Skills
- Team Building
- Problem Solving
- Oral Communication
- Accountability

Table 29. Professional Competency Ratings: Criticality

Competency	N	Mean	SD
Interpersonal Skills	1,253	4.34	0.84
Team Building	1,251	4.24	0.91
Problem Solving	1,250	4.17	0.86
Oral Communication	1,250	4.16	1.01
Accountability	1,251	4.16	0.86
Decisiveness	1,253	4.13	0.86
Flexibility	1,251	4.12	0.91
Resilience	1,252	4.04	0.90
Influencing and Negotiating	1,242	3.96	0.98
Partnering	1,244	3.95	0.94

Proficiency Comparisons of Professional Competencies

As seen in Table 24, the competencies our respondents perform at the highest proficiency level are:

- Interpersonal Skills
- Accountability
- Problem Solving
- Team Building
- Flexibility

Table 30. Professional Competency Ratings: Proficiency

Competency	N	Mean	SD
Interpersonal Skills	1,256	4.11	0.77
Accountability	1,253	4.02	0.82
Problem Solving	1,250	4.01	0.82
Team Building	1,248	4.00	0.83
Flexibility	1,252	3.98	0.84
Decisiveness	1,254	3.94	0.82
Oral Communication	1,251	3.93	0.88
Resilience	1,252	3.92	0.84
Influencing and Negotiating	1,246	3.81	0.89
Partnering	1,248	3.77	0.86

All Ratings Comparisons of Professional Competencies

As we saw in the technical competencies, in general those that are most frequent and critical, are also those that have the highest proficiency. As table 31 shows the top professional competencies across

frequency, criticality and proficiency are Interpersonal Skills, followed by Team Building and Accountability.

Table 31. Frequency, Criticality, and Proficiency Ratings

Competency	Frequency	Criticality	Proficiency	Average Frequency and Criticality
Interpersonal Skills	4.63	4.34	4.11	4.49
Team Building	4.36	4.24	4.00	4.30
Accountability	4.32	4.16	4.02	4.24
Problem Solving	4.25	4.17	4.01	4.21
Flexibility	4.29	4.12	3.98	4.21
Oral Communication	4.17	4.16	3.93	4.17
Decisiveness	4.16	4.13	3.94	4.15
Resilience	4.13	4.04	3.92	4.09
Influencing and Negotiating	4.10	3.96	3.81	4.03
Partnering	4.01	3.95	3.77	3.98

Opportunities for Positive Change in Professional Competencies

Overall, PMs rated all the professional competencies very high across frequency and criticality. Professional competencies should be incorporated into most training and development activities because they cut across all technical activities of the job and underlie superior performance.

Comparing our current results versus our development (Phase II) results, we see some differences. Two competencies, although rated highly by the Subject Matter Experts (SMEs) in the development process are now on the lower end of ratings in the current Phase IV results. While still rated generally very high, those two competencies, Oral Communication and Influencing and Negotiating, were consistently rated lower in proficiency by the assessment respondents.

Those two competencies, Oral Communication and Influencing and Negotiating, are in the bottom ranking of proficiency ratings with ratings of 3.93 and 3.81, respectively.

Additional Program Management Demographic Comparisons

Demographic Comparison 1: Statistical Comparison by Component

Differences Were Found Among Components in Frequency, Criticality, and Proficiency

In our analysis, we found statistically significant differences in frequency, criticality and proficiency across the Major Service Components of Air Force, Army, Navy, and Fourth Estate, as well as a small group denoted as Other (See Tables 32, 33, and 34).

Frequency Comparisons

- For Unit 1: Information Management (IM), Information Technology (IT) And Software Management, those in the Fourth Estate (mean 3.17), perform activities related to Unit 1 significantly more frequently than Air Force, Army, and Navy (2.43, 2.22, and 2.25 respectively).
- For Unit 2: Overseeing the Contracting Process, Unit 3: Life Cycle Planning and Production, Unit 4: Managing Programs and People, and Unit 5: Process Management, there were no significant differences.
- For Unit 6: Life-Cycle Budgeting and Financial Planning, the Fourth Estate performs these activities more frequently (mean 3.38) than the other Major Service Components (Air Force, 2.34; Army, 2.40; Navy, 2.46).
- For Unit 7: Technical Management Process, there were no significant differences.
- For Unit 8: Identify and Protect Technologies, there were 2 groups of significant differences. Air Force (2.63) is statistically greater than Army (2.37), and the Fourth Estate (3.43)

is significantly greater compared to Army (2.37) and Navy (2.48).

- For Unit 9: International/Joint/Inter-Agency Program Management, there were significant differences in comparison between Others (4.33) and Air Force, Army, and Navy (2.34, 2.34, and, 2.45 respectively).

Table 32. Component Comparisons of Frequency

Unit of Competence	Component	N	Mean
Unit 1: Information Management (IM), Information Technology (IT) And Software Management	Air Force	329	2.43
	Army	271	2.22
	Navy	268	2.25
	Fourth Estate	12	3.17
	Other	5	2.20
Unit 6: Life-Cycle Budgeting and Financial Planning	Air Force	334	2.34
	Army	298	2.40
	Navy	277	2.46
	Fourth Estate	13	3.38
	Other	5	2.20
Unit 8: Identify and Protect Technologies	Air Force	387	2.63
	Army	328	2.37
	Navy	317	2.48
	Fourth Estate	14	3.43
	Other	5	3.20
Unit 8: Identify and Protect Technologies	Air Force	387	2.63
	Army	328	2.37
	Navy	317	2.48
	Fourth Estate	14	3.43
	Other	5	3.20
Unit 9: International/Joint/Inter-Agency Program Management	Air Force	401	2.34
	Army	362	2.34
	Navy	330	2.45
	Fourth Estate	17	2.82
	Other	6	4.33
KEY			
Rated Significantly Lower than Comparison Component			YELLOW
Rated Significantly Higher than Comparison Component			GREEN
Not Significantly Different in the Unit Comparison			No Shading

As table 32 shows, for Units 1, 6, and 8, there were significant differences in that those in the Fourth Estate perform the related activities more often. Unit 8 is listed twice because there are two sets of significant differences.

Criticality Comparisons

There were many differences in how the Program Managers from the Major Service Components view the criticality of the various Units of Competence that make up their jobs.

- For Unit 1: Information Management (IM), Information Technology (IT) and Software Management, Air Force (mean 2.73) sees this Unit as significantly more critical than Army (2.43).
- For Unit 2: Overseeing the Contracting Process, Unit 3: Life Cycle Planning and Production, there are no significant differences.
- For Unit 4: Managing Programs and People, the Air Force (3.48) sees this as significantly more critical than Army (3.24).
- For Unit 5: Process Management, there are no significant differences.
- For Unit 6; Life-Cycle Budgeting and Financial Planning, the Fourth Estate PMs saw this Unit as significantly more critical (3.62) compared to Air Force, Army, or Navy (2.63, 2.63, 2.72) respectively.
- For Unit 7: Technical Management Process, the Air Force (3.15) sees this as significantly more critical than Army (2.92).
- For Unit 8: Identify and Protect Technologies, the Air Force (3.15) sees this as significantly more critical than Navy (3.02).
- For Unit 9: International/Joint/Inter-Agency Program Management, those denoted as Other see this Unit as significantly more critical (4.50) than Air Force, Army, and Navy (2.39, 2.32, 2.34, respectively).

Table 33. Component Comparison of Criticality

Unit of Competence	Component	N	Mean
Unit 1: Information Management (IM), Information Technology (IT) and Software Management	Air Force	325	2.73
	Army	265	2.43
	Navy	262	2.51
	Fourth Estate	12	3.29
	Other	5	2.17
Unit 4: Managing Programs and People	Air Force	377	3.48
	Army	325	3.24
	Navy	328	3.36
	Fourth Estate	12	3.76
	Other	5	3.66
Unit 6: Life-Cycle Budgeting and Financial Planning	Air Force	326	2.63
	Army	294	2.63
	Navy	267	2.72
	Fourth Estate	13	3.62
	Other	5	2.80
Unit 7: Technical Management Process	Air Force	374	3.15
	Army	318	2.92
	Navy	322	3.01
	Fourth Estate	13	3.50
	Other	6	2.75
Unit 8: Identify and Protect Technologies	Air Force	388	3.02
	Army	322	2.64
	Navy	315	2.71
	Fourth Estate	12	3.75
	Other	5	3.20
Unit 9: International/Joint/Inter-Agency Program Management	Air Force	389	2.39
	Army	352	2.32
	Navy	327	2.34
	Fourth Estate	15	2.80
	Other	6	4.50

Proficiency Comparisons

With regards to proficiency, there are significant differences across components for only one Unit of Competence (Table 34). For Unit 2: Overseeing the Contracting Process, there are significant differences between Air Force and Army (mean 3.13 and 3.08 respectively) compared to Navy (2.87).

Table 34. Component Comparison of Proficiency

Unit of Competence	Component	N	Mean
Unit 2: Overseeing the Contracting Process	Air Force	403	3.13
	Army	326	3.08
	Navy	316	2.87
	Fourth Estate	19	3.29
	Other	5	2.80

Demographic Comparison 2: Statistical Comparison by Assignment Type

Significant Differences Found among Assignment Types across All Ratings

Our respondents were asked to categorize their assignment type as Weapon Systems, Business Management, Services, or International Program Management. Our analysis revealed statistically significant differences in how often activities are performed and how the activities are viewed in terms of criticality and self-rated proficiency ratings across the four Assignment Types. Please see Appendix D for differences at the competency-level across all ratings. Detailed below is the breakdown of means with significant differences denoted by highlighted boxes.

Frequency Breakdown by Assignment Type

Overall this analysis shows that Program Managers perform very different levels of activities based on the type of program in which they work.

- For Unit 1: Information Management (IM), Information Technology (IT) and Software Management, there are significant differences across Assignment Types for Services program managers (2.03) compared to both Weapons Systems and Business Management program managers (2.34 and 2.50 respectively). In addition there were differences between International (1.89) versus Weapons Systems and Business Management.
- For Unit 2: Overseeing the Contracting Process there were no significant differences.

- For Unit 3: Life Cycle Planning and Production, there are significant differences between Weapons Systems (2.59) compared to Services and Business Management (2.23 and 2.08 respectively).
- For Unit 4: Managing Programs and People there is a significant difference between Weapons Systems (3.43) and Services (3.10).
- For Unit 5: Process Management there are significant differences between Weapons Systems (3.11) and Business Management and Services (2.89 and 2.74 respectively).
- For Unit 6, Life-Cycle Budgeting and Financial Planning there are significant differences between Business Management (2.64) versus Weapons System and Services (2.39 and 2.20 respectively).
- For Unit 7: Technical Management Process there is a significant difference between Weapons Systems (3.00) and Services (2.50).
- For Unit 8: Identify and Protect Technologies there were no significant differences.
- For Unit 9: International/Joint/Inter-Agency Program Management there are significant differences between International (4.79) and Weapons Systems, Business Management, and Services (2.40, 1.97, and 2.17, respectively).

Table 35. Frequency by Assignment Type

Unit of Competence	Assignment Type	N	Mean
Unit 1: Information Management (IM), Information Technology (IT) and Software Management	Weapons Systems	581	2.34
	Business Management	175	2.50
	Services	107	2.03
	International	28	1.89
Unit 1: Information Management (IM), Information Technology (IT) and Software Management	Weapons Systems	581	2.34
	Business Management	175	2.50
	Services	107	2.03
	International	28	1.89
Unit 3: Life Cycle Planning and Production	Weapons Systems	566	2.59
	Business Management	148	2.23
	Services	96	2.08
	International	26	2.24
Unit 4: Managing Programs and People	Weapons Systems	708	3.43
	Business Management	202	3.29
	Services	123	3.10
	International	34	3.11
Unit 5: Process Management	Weapons Systems	664	3.11
	Business Management	179	2.89
	Services	116	2.74
	International	27	2.57
Unit 6: Life-Cycle Budgeting and Financial Planning	Weapons Systems	603	2.39
	Business Management	192	2.64
	Services	110	2.20
	International	28	2.16
Unit 7: Technical Management Process	Weapons Systems	694	3.00
	Business Management	191	2.68
	Services	127	2.50
	International	35	2.61
Unit 9; International/Joint/Inter-Agency Program Management	Weapons Systems	722	2.40
	Business Management	209	1.97
	Services	145	2.17
	International	47	4.79
KEY			
Rated Significantly Lower than Comparison Assignment		YELLOW	
Rated Significantly Higher than Comparison Assignment		GREEN	
Not Significantly Different in the Unit Comparison		No Shading	

Criticality Breakdown by Assignment Type

Overall this analysis shows that Program Managers see the criticality of each Unit of Competence very differently depending upon the type of program in which they work.

- For Unit 1: Information Management (IM), Information Technology (IT) and Software Management, there are significant differences across Assignment Types for Weapons Systems and Business Management (2.62 and 2.71 respectively) versus Services (2.21).
- For Unit 2: Overseeing the Contracting Process, there were no significant differences.
- For Unit 3: Life Cycle Planning and Production, there are significant differences between Weapons Systems (2.91) and Business Management, Services, and International (2.48, 2.25, and 2.20 respectively).
- For Unit 4: Managing Programs and People, there is a significant difference between Weapons Systems (3.46) and Services (3.06).
- For Unit 5: Process Management, there are significant differences between Weapons Systems (3.14) and Services and International (2.80 and 2.51 respectively).
- For Unit 6: Life-Cycle Budgeting and Financial Planning, there are significant differences between Weapons Systems and Business Management (2.69 and 2.88) compared to Services (2.34).
- For Unit 7: Technical Management Process, there are significant differences between Weapons Systems (3.18) and Business Management and Services (2.85 and 2.61).
- For Unit 8: Identify and Protect Technologies, there are significant differences between Weapons Systems and Business Management (2.88 and 2.90) and Services (2.47).
- For Unit 9: International/Joint/Inter-Agency Program Management, there are significant differences between Interna-

tional (4.62) and Weapons Systems, Business Management, and Services (2.34, 1.98 and 2.26 respectively).

Table 36. Criticality by Assignment Type

Unit of Competence	Assignment Type	N	Mean
Unit 1: Information Management (IM), Information Technology (IT) and Software Management	Weapons Systems	575	2.62
	Business Management	171	2.71
	Services	101	2.21
	International	28	2.20
Unit 3: Life Cycle Planning and Production	Weapons Systems	550	2.91
	Business Management	142	2.48
	Services	95	2.25
	International	24	2.20
Unit 4: Managing Programs and People	Weapons Systems	706	3.46
	Business Management	196	3.29
	Services	119	3.06
	International	33	3.06
Unit 5: Process Management	Weapons Systems	651	3.14
	Business Management	170	2.96
	Services	114	2.80
	International	27	2.51
Unit 6: Life-Cycle Budgeting and Financial Planning	Weapons Systems	590	2.69
	Business Management	189	2.88
	Services	106	2.34
	International	26	2.23
Unit 7: Technical Management Process	Weapons Systems	689	3.18
	Business Management	191	2.85
	Services	126	2.61
	International	33	2.69
Unit 8: Identify and Protect Technologies	Weapons Systems	698	2.88
	Business Management	192	2.90
	Services	124	2.47
	International	34	2.62
Unit 9: International/Joint/Inter-Agency Program Management	Weapons Systems	710	2.34
	Business Management	200	1.98
	Services	139	2.26
	International	47	4.62

Proficiency Breakdown by Assignment Type

Overall this analysis shows that Program Manager’s in different Assignment Types see themselves as having significantly different levels of proficiency. We see that Weapons Systems PMs have the

highest mean proficiency for all Units with significant differences except in Unit 9: International/Joint/Inter-Agency Program Management.

- For Unit 1: Information Management (IM), Information Technology (IT) and Software Management, and Unit 2: Overseeing the Contracting Process there were no significant differences in proficiency.
- For Unit 3: Life Cycle Planning and Production, there are significant differences between Weapon Systems (2.85) and Business Management and Services, (both with 2.56).
- For Unit 4: Managing Programs and People, there are significant differences between Weapons Systems (3.32) compared to Business Management (3.11).
- For Unit 5: Process Management, there are significant differences between Weapons Systems (3.16), and Business Management and Services (2.92 and 2.95 respectively).
- For Unit 6: Life-Cycle Budgeting and Financial Planning, there are no significant differences.
- For Unit 7: Technical Management Process, there are significant differences between Weapons Systems (3.01), and Business Management and Services (2.66 and 2.64).
- For Unit 8: Identify and Protect Technologies, there are no significant differences.
- For Unit 9: International/Joint/Inter-Agency Program Management, there are significant differences between PMs in International (4.32), and Weapons Systems, Business Management, and Services (2.53, 2.30, and 2.39, respectively).

Table 37. Proficiency by Assignment Type

Unit of Competence	Assignment Type	N	Mean
Unit 3: Life Cycle Planning and Production	Weapons Systems	603	2.85
	Business Management	148	2.56
	Services	98	2.56
	International	28	2.73
Unit 4: Managing Programs and People	Weapons Systems	737	3.32
	Business Management	228	3.11
	Services	140	3.04
	International	37	3.34
Unit 5: Process Management	Weapons Systems	681	3.16
	Business Management	184	2.92
	Services	115	2.95
	International	34	2.94
Unit 7: Technical Management Process	Weapons Systems	708	3.01
	Business Management	197	2.66
	Services	137	2.64
	International	34	2.82
Unit 9: International/Joint/Inter-Agency Program Management	Weapons Systems	708	2.53
	Business Management	207	2.30
	Services	135	2.39
	International	47	4.32

Program Management Technical Competency Gap Analysis

Use of Individuals as the Proficiency Standard

We used the means of individuals who had been demarcated by supervisors as belonging to a specific career level (entry, journey, or senior level) as a proxy for the proficiency standard. Please see Appendix C for a complete listing of the proficiency standards at the Entry, Journey, and Senior levels.

Previous work had developed standards based on a six-point scale, but these competencies and rating means were not transferable to the current competency set. We believe this to be a suitable proxy for proficiency standards that will be developed and refined over time. Future strategic planning groups should review the standards to ensure they meet the requirements of PM career field.

Comparison of Individual and Supervisor Ratings

When comparing individual ratings to those of supervisors we found a small but marked difference. On average supervisors rated our individuals .36 points higher than the self-ratings. There has been research that interprets supervisor and employee differences. Most show evidence that supervisors rate individuals more negatively than the employees rate themselves, which is called leniency-bias (see for example, Holzbach, 1978.) A study by Farh & Dobbins (1989) noted that leniency bias can be removed from self-ratings by clearly defining each dimension. The goal of the current Competency Model development is to create Competency Models that allow for an understanding of superior performance. This assessment was designed to use behavioral statements where respondents can rate themselves specifically enough to avoid leniency bias, which we believe was accomplished based on this result.

Gap Analysis Using Proficiency Standards

To analyze gaps we analyzed how each member of our full sample compared to the mean of the employee self ratings for each competency. This list of means make up the draft proficiency standards for each competency in the competency model.

Our gap analysis utilizes our entire sample classified into career levels using grade/rank as a proxy to put each respondent into a career level category as Entry, Journey, or Senior level.

It is important to note that the proficiency standards are based only upon those individuals for which we had career level demarcations provided by their supervisors. Our proficiency standards are based upon the ratings we have received from our matched pairs of employee and supervisor ratings. Overall we had 450 supervisors providing ratings. However we only had 328 total matched pairs as supervisors provided ratings for individuals who never completed their matching self-ratings. These demarcations were made by supervisors in the demographics section prior to providing ratings.

See Table 38 below for the number at each career level that were utilized to develop our proficiency standards. Only their individual ratings were used because this group was the only group that were demarcated by supervisors as Entry-, Journey-, and Senior-level.

Table 38. Sample Used to Develop Proficiency Standard

Career Level	Number Utilized
Entry Level	28
Journey Level	99
Senior Level	201
Total	328

Details On Gap Analysis Charts

Our goal was to produce a useful chart for each competency that will detail the percentage of the sample above and below the target proficiency standard, in one-point increments. The charts on the following pages look at each of the competencies in groups of five in two career level sections: Journey level, and Senior level. The categories by which the sample is divided are:

- 1) 3.01+ pts Above Standard
- 2) Between 2.01 and 3.00 Above Standard
- 3) Between 1.01 and 2.00 Above Standard,
- 4) Between 0.00 and 1.00 Above Standard
- 5) Between 0.01 and 1.00 Below Standard
- 6) Between 1.01 and 2.00 Below Standard
- 7) Between 2.01 and 3.00 Below Standard
- 8) 3.01+ Below Standard.

In addition, any competency grouping category with more than 30 percent of the sample within each cell will be highlighted. In addition, a dark black box has surrounded any positive or negative gap section to signify that, although there is no highlighted portion, there is actually more than 50 percent of the sample on that particular half of the competency chart.

These charts are intended as a useful tool and format for future workforce diagnostics. See Figure 5 below for a visual key for the tables that follow.

Figure 5. Gap Analysis Chart Detail

	Rating Category	Competency 1 Entry
Positive Gap	3.01+ pts Above Standard	<i>Percent of the sample in this grouping</i>
	Between 2.01 and 3.00 Above Standard	<i>Percent of the sample in this grouping</i>
	Between 1.01 and 2.00 Above Standard	<i>Percent of the sample in this grouping</i>
	Between 0.00 and 1.00 Above Standard	<i>Percent of the sample in this grouping</i>
Proficiency Standard (Mean of Individual Employees)		Proficiency Standard
Negative Gap	Between 0.01 and 1.00 Below Standard	<i>Percent of the sample in this grouping</i>
	Between 1.01 and 2.00 Below Standard	<i>Percent of the sample in this grouping</i>
	Between 2.01 and 3.00 Below Standard	<i>Percent of the sample in this grouping</i>
	3.01+ Below Standard	<i>Percent of the sample in this grouping</i>

Entry Level Comparisons Were Not Conducted

The findings for Entry Level are not displayed because the sample size was not sufficiently large to approximate the Entry-Level population.

Journey Level Comparisons for Top Rated Competencies

In table 39 below, we have presented the gap analysis for the highest rated competencies across all rating types (frequency, criticality, and proficiency). This table shows where each member of sample at the Journey level falls within the 8 levels of ratings, and provides an extra level of definition to the results presented as means earlier in the report.

As seen below there are differences in the way the competencies are reflected across the PM Journey sample. We can see a majority of the sample falling above the proficiency standard for four out of the five competencies, with one exception: competency 1.8 Working Groups and Teams.

In this case, competency, 1.8 Working Groups and Teams shows 50.8% of the sample falling below the proficiency standard. In contrast, for competencies 1.6 Risk and Opportunity Management, 1.2 Concept Selection Process (Pre-Project/Pre-Program); Technology Development Strategy, and 8.2 Prepare Requirements & Support, we see examples of good news proficiency for the workforce with 26.5%, 25.1% and 20.6% percent of the sample respectively that are between 1.01 and 2.00 above the proficiency standard. In addition these same competencies show a pattern with a majority of the sample falling above the proficiency standard, and more than five percent of the sample falling 2 or more points above the proficiency standard. Lastly, for competency 8.3 Prepare and Issue Solicitation, the majority of the sample falls above the proficiency standard with 67.9% of the sample above the proficiency standard.

Table 39. Journey Level Gap Analysis – The Top 5 Competencies

	1.8 Working Groups and Teams		1.6 Risk and Opportunity Management		1.2 Concept Selection Process (Pre-Project/ Pre-Program); Technology Development Strategy		8.3 Prepare and Issue Solicitation		8.2 Prepare Requirements & Support Documentation	
	#	Percent	#	Percent	#	Percent	#	Percent	#	Percent
3.01 or More Above	0	.0	0	.0	0	.0	0	.0	0	.0
Between 2.01 and 3.00 Above	0	.0	29	5.6	32	5.6	0	.0	47	9.7
Between 1.01 and 2.00 Above	75	14.3	137	26.5	143	25.1	54	11.1	100	20.6
Between 0.00 and 1.00 Above	184	35.0	196	37.9	203	35.7	277	56.8	184	37.9
Proficiency Standard	3.41		2.99		2.96		3.00		2.92	
Between 0.01 and 1.00 Below	177	33.7	103	19.9	118	20.7	93	19.1	99	20.4
Between 1.01 and 2.00 Below	57	10.8	52	10.1	73	12.8	64	13.1	56	11.5
Between 2.01 to 3.00 Below	33	6.3	0	.0	0	.0	0	.0	0	.0
More than 3.01 pts Below	0	.0	0	.0	0	.0	0	.0	0	.0
Total	526	100.0	517	100.0	569	100.0	488	100.0	486	100.0

Key	
More than 30 percent in a Positive Gap category	
More than 30 percent in a Negative Gap category	
A portion with more than 50 percent of the sample ²	

² The dark black box surrounding the positive or negative gap portion signifies that there is actually more than 50 percent of the sample on the negative gap portion.

Senior Level Comparisons for Top Rated Competencies

In table 40 below, we have presented the gap analysis for the highest rated competencies across all rating types (frequency, criticality, and proficiency). This table shows where each member of sample at the Senior level falls within the 8 levels of ratings, and provides an extra level of definition to the results presented as means earlier in the report.

Across the Senior level there is a general positive gap pattern with all of the cells with over 30 percent falling above the proficiency standard. Looking at the top five competencies in detail we see that for four out of five competencies have a majority of the sample above the proficiency standard.

For competency 1.8 Working Groups and Teams, 74.4% of the sample falls above the proficiency standard. Additionally we see that 27.5 of the sample is between 1.01 and 2.00 above the proficiency standard. This is a positive indicator for this key ingredient in being a successful program manger.

Across the three competencies, 1.6 Risk and Opportunity Management, 1.2 Concept Selection Process(Pre-Project/Pre-Program); Technology Development Strategy, and 8.3 Prepare and Issue Solicitation there is a similar patterns of results with a majority of the sample above the proficiency standard (52.5%, 52.9%, 49.0% of the sample respectively). In contrast, for competency 8.2 Prepare Requirements and Support Documentation there is a majority of the sample that falls below the proficiency standard (56.8% of the sample). Additionally, we see that 19.9% of the sample is between 1.01 and 2.00 Below the proficiency standard. This shows that there is a significant part of the sample with a negative gap for this competency.

Table 40. Senior Level Gap Analysis – The Top 5 Competencies

	1.8 Working Groups and Teams		1.6 Risk and Opportunity Management		1.2 Concept Selection Process (Pre-Project/Pre-Program); Technology Development Strategy		8.3 Prepare and Issue Solicitation		8.2 Prepare Requirements & Support Documentation	
	#	Percent	#	Percent	#	Percent	#	Percent	#	Percent
3.01 or More Above	0	.0	0	.0	0	.0	0	.0	0	.0
Between 2.01 and 3.00 Above	0	.0	0	.0	0	.0	0	.0	0	.0
Between 1.01 and 2.00 Above	208	27.5	104	13.6	103	12.4	87	12.4	76	10.9
Between 0.00 and 1.00 Above	355	46.9	299	39.0	336	40.5	258	36.6	225	32.2
Proficiency Standard	3.91		3.34		3.48		3.33		3.22	
Between 0.01 and 1.00 Below	149	19.7	213	27.8	227	27.3	187	26.6	198	28.4
Between 1.01 and 2.00 Below	31	4.1	113	14.7	111	13.4	113	16.1	139	19.9
Between 2.01 to 3.00 Below	14	1.8	38	5.0	53	6.4	59	8.4	60	8.6
More than 3.01 pts Below	0	.0	0	.0	0	.0	0	.0	0	.0
Total	757	100.0	767	100.0	830	100.0	704	100.0	698	100.0

Recommendations and Conclusions

Outcomes of the Current Study

The current study's results provide for the end of Phase IV of our Competency Development and Management Process and include the following outcomes:

- A PM Competency Model that is validated through analysis of respondent competency ratings to include both frequency and criticality ratings.
- A data-based nine Unit of Competence Competency Model structure developed based on our analysis of participant responses.³
- Proficiency standards developed for use in future applications and sustainment of the model.
- A Gap analysis conducted at the competency-level for Journey-, and Senior-level respondents.

In addition to these four outcomes, we have gained a deeper understanding of the competencies used by the workforce, and developed further a layout of future activities to ensure sustainment of the Competency Model. We can definitively say that this model is relevant to the PM workforce. Our comparisons of Component and military/civilian status, as well as years experience information, among other data demonstrate our sample's match to the FY 2007 PM population received from DAU.

³ In addition to the nine Units of Competence encapsulating all the technical competencies, we placed the professional competencies in a separate tenth Unit of Competence called **Unit 10: PM Professional Competencies**

Use the New Competency Model Structure to Assess the Workforce

As part of our validation process, we created a final Competency Model structure for use in assessments for later competency management applications. We conducted a factor analysis, a data reduction technique commonly used to better understand the underlying structure of our competencies. Our analysis revealed a structure with nine Units of Competence:

- **Unit 1: Information Management (IM), Information Technology (IT), And Software Management**
- **Unit 2: Overseeing the Contracting Process**
- **Unit 3: Life-Cycle Planning and Production**
- **Unit 4: Managing Programs and People**
- **Unit 5: Process Management**
- **Unit 6: Life-Cycle Budgeting and Financial Planning**
- **Unit 7: Technical Management Process**
- **Unit 8: Identify and Protect Technologies**
- **Unit 9: International/ Joint/Inter-Agency Program Management**

In addition to the nine Units of Competence encapsulating all the technical competencies, we placed the professional competencies in a separate tenth Unit of Competence called: PM Professional Competencies.

The relationship between the competencies in each Unit of Competence should be used to understand which behaviors are performed similarly as reported by the program managers. This has implications for curriculum developers, PM planners, and career managers in understanding how work is actually being performed by members of the career field.

Utilize a Competency-to-Training Matrix to Evaluate Course Learning Objectives

Evaluate Training Content for Coverage of the on the Highest-rated Units

Similar to other career fields, an overall PM competency-to-training course evaluation could be conducted by creating a competency-to-training course matrix to include both technical and professional competencies.

This overall course evaluation should ensure that Units of Competence seen as high in frequency and criticality are targeted in the PM training curriculum. According to ratings provided by our participants the Units with the highest ratings across frequency and criticality are:

- Unit 4: Managing Programs and People
- Unit 2: Overseeing the Contracting Process
- Unit 5: Process Management

Evaluate Training Content at Entry, Journey, and Senior Levels for the Highest-Rated Competencies

The competencies that are used the most and are most critical to the job of a Program Manager, are:

- 1.8 Working Groups and Teams
- 1.6 Risk and Opportunity Management
- 1.2 Concept Selection Process (Pre-Project/Pre-Program); Technology Development Strategy
- 8.3 Prepare and Issue Solicitation
- 8.2 Prepare Requirements & Support Documentation⁴

⁴ Although this competency denotes documentation preparation, in actuality the element relates instead to overseeing the requirements documentation preparation

In addition, the top professional competencies across frequency, criticality and proficiency are Interpersonal Skills, followed by Team Building and Accountability.

Critically Analyze Competencies with Lower Frequency and Criticality

Beyond looking at the highest rated competencies, it is also valuable to critically evaluate those competencies that were rated lowest. These ratings may give us more information about the beliefs of Program Managers across the DoD. For example, when looking across the competencies with low ratings, such as 4.3 Software Reuse and 10.2 Produce Product, we should compare these ratings to our beliefs regarding these competency areas. It is important to then evaluate whether these particular competencies should be rated lowest. These ratings may show a lack of focus on a particular area that may be deemed critical to future program management success. It is an appropriate next step to investigate these findings further with a panel of experts.

Important Targets for Training and Development include Competencies with Low Proficiency Ratings but High Frequency and Criticality Ratings

Differences in proficiency versus other ratings are an important consideration because those competencies that have lower proficiency ratings but relatively higher ratings in criticality and frequency may be important targets for training and development efforts. The following two competencies are rated as critical portions of their jobs, but relatively lower in terms of proficiency:

- 9.1 Cost Estimating
- 1.5 Life-Cycle Cost Management

Since these competencies are used frequently and are highly critical, and our workforce has limited proficiency, then this is an important finding that should be addressed. This suggests that, in general, Program Managers view these competencies as critical and frequent behaviors that are required to successfully perform the job. However, given that they also rate these low in proficiency, a closer review of training and development activities related to these two competencies should be focused in these areas.

Opportunities for Positive Change in Professional Competencies

Overall, PMs rated all the professional competencies very high across frequency and criticality. Professional competencies should be incorporated into all training and development activities because they cut across all technical activities of the job.

Comparing our current results versus our development (Phase II) results, we see some differences. Two competencies, although rated highly by the Subject Matter Experts (SMEs) in the development process are now on the lower end of ratings in the current Phase IV results. While still rated generally very high, those two competencies, Oral Communication and Influencing and Negotiating, were consistently rated lower in proficiency by the assessment respondents.

Training resources should be evaluated for coverage for these two additional competencies in addition to all of the highly-rated competencies.

Use Assignment Type and Major Service Component Information to Aid in Development, Evaluation, and Future Career Planning of PMs

Characteristics of the job of program managers may impact each program manager's specific training needs. Therefore, when assigning, developing, and evaluating a PM, their Assignment Type and Major Service Component information should play an important role based on differences in a PM's job related to these factors.

Each Program Manager's job is impacted by their specific Assignment Type

Take Assignment Type Into Account when Developing IDPs

Our demographic analysis shows that program managers see their work very differently depending upon the type of program in which they work. As our results show, there are large differences between the groups defined by Assignment Type (Weapons Systems, Business Management, Services, and International) as shown in their differences in ratings across (frequency, criticality, and proficiency). Their Assignment Type, impacts their job greatly and this fact is re-

flected in differences in how they rate frequency, criticality, and proficiency of each of the competencies. Each learner's assignment and future assignments must be taken into account when developing Individual Development Plans (IDPs). The IDPs could be crafted to specifically address challenges faced in that PM's particular assignment type and associated career path.

For instance, those who work Weapons Systems programs see Unit 3: Life-Cycle Planning and Production as more critical to their job than those who work in Business Management, Services, and International assignment types. In addition, Weapons Systems also rate themselves as significantly more proficient and perform more Unit 3 functions than Business Management and Services. Weapons Systems PMs therefore must have more emphasis in their training in regarding the competencies contained in Unit 3. Those PM's who are involved in Weapons Systems also make up the largest group in our sample.

The complicating factor is the fact that PMs usually move within organization in the course of their careers. According to the GAO (March 2008), the average tenure of a PM in a program is 17 months—less than half of what is prescribed by DOD policy which impacts program continuity and accountability. Knowing that PMs are constantly moving between organizations makes informed IDPs all the more important. This understanding makes Assignment Type information, for each PM, a critical piece in training, developmental opportunities, and overall career planning.

Each Program Manager's job is impacted by their specific Component

As Necessary, Supplement DoD-Wide Training With Service-Specific Training and Development Opportunities

In our analysis, we found significant differences in frequency, criticality, and proficiency across each of the Major Service Components. If the job of a PM varies from Service to Service, it would be critical to supplement DoD-wide training with service-specific training and development opportunities. Training and career development opportunities at each Service should be analyzed to see if they specifically address the requirement differences in their specific Service. If they do not adequately cover the differences than there

may be a need to supplement with some Service-specific training prior to assignment. Additionally, evaluating the differences by Component could be a developmental exercise performed in training or as a regular point of discussion in cross-Component meetings.

Use Competencies for Creating Proficiency Standards, Developing Workforce Plans, Workforce Assessments, and Career Paths

The current gap analysis was carried out utilizing the employee ratings to compare these ratings against the distribution in the sample. The results are displayed in a simple and straightforward manner that can also be used in future applications. The results show a mix of positive and negative gap patterns across the competencies. See Appendix G for a competency gap analysis breakdown across all the competencies.

For example, at the senior level the highest rated competency, competency 1.8 Working Groups and Teams, shows that the majority of the sample falls above the standard (74.4% above vs. 26.6% below). However, 5.9% of the sample are more than 1 point below the proficiency standard. This proficiency standard is one of the highest across the competency set, but is also the most critical and frequently used competency. Results such as these could be used in combination with other workforce planning efforts.

Given that this sample has told us that approximately 35.7 percent of this group retiring within 5 years, as seen in the demographic items noted in the first section of this report, investigations should be undertaken to see if program managers have the proper replacements in place pending retirements and their impact. If they do not have the proper expertise, additional analysis should look to see if you have the appropriate recruitment and retention strategies in place.

In the future it will be necessary to choose specific competencies that the community is concerned about at specific career intervals (entry, journey, senior). Once these competencies are identified it would be useful to then look at how the PM community is arranged

in terms of the distributions of gaps by career level, by service, or even down to the Major Command level. It would also be beneficial to look at what competencies gaps are being supplemented by Contractor support and at what cost the community. As the March 2008 GAO report notes, 48 percent of programs the report assessed was made up of individuals outside of the Government.

Utilize the Proficiency Standards in Future Gap Analysis

The proficiency standards can be used as a baseline proficiency standard for future studies looking at PM proficiency and gap analysis. In addition, these new standards can be used to look at large workforce planning issues in conjunction with demographic information.

Future steps should include revisiting the proficiency standards with a panel of experts in order to ensure that these standards are comparable to certification level and provide correct assumptions about expectations in the workforce. Utilizing these proficiency standards as a baseline for future analysis will prove to be a valuable workforce assessment tool.

Appendix A: Program Management Competency Model

The current Competency Model is composed of 10 Original Units of Competence, 35 technical competencies (with 45 technical elements) and, 10 professional competencies.

Unit of Competence	Competency	Current Elements
1. Management Process	1.1 Requirements Process (Pre-Project/Pre-Program)	1.1.1 Evaluate, relative to capability gaps, materiel/non-materiel concepts to develop a program definition.
	1.2 Concept Selection Process (Pre-Project/Pre-Program); Technology Development Strategy	1.2.1 Refine concepts, analysis of alternatives and assumptions to select a preferred course of action.
	1.3 Technology Development Process (Pre-Project/Pre-Program)	1.3.1 Expand user's needs to determine program system requirements, KPPs and Acq Base-line.
	1.3 Technology Development Process (Pre-Project/Pre-Program)	1.3.2 Prepare Acquisition Strategy with stakeholder support to ensure that it is aligned with program objectives.
	1.4 Core Management Skills and Processes	1.4.1 Manage the program strategy, scope of work and resources to streamline the schedule, and meet planned costs.
	1.4 Core Management Skills and Processes	1.4.2 Plan and document an Integrated Master Plan and Schedule to determine phased inputs, outputs, deliverables, review process, audits, and performance objectives.
	1.4 Core Management Skills and Processes	1.4.3 Prepare a WBS for the program that integrates risks, costs, and overall EVM process from start to finish of the program.
	1.4 Core Management Skills and Processes	1.4.4 Establish a program team with the suppliers and contractors to plan the process for mapping the organization, aligning resources and coordinating joint program review strategies.
	1.4 Core Management Skills and Processes	1.4.5 Implement and manage the EVM process to track and assess the scope of work, technical performance measurements, and the integrated baseline review process.
	1.5 Life-Cycle Cost Management	1.5.1 Oversee the application of Agency/OMB financial management policies to manage the program costs.

	1.6 Risk and Opportunity Management	1.6.1 Establish and manage the risk/opportunity process to reduce risks and exploit opportunities.
	1.7 Joint/ Inter-Agency/ International Program Management	1.7.1 Oversee and manage actions to serve the unique needs of select domestic agencies, and foreign government(s) or international organization(s).
	1.8 Working Groups and Teams	1.8.1 Organize, manage, coach, lead and evaluate working groups, IPTs, project-oriented teams and related support contractors and system integrators to maximize efficiency within the program.
2. Information Management (IM)/Information Technology (IT)	2.1 Configuration Management	2.1.1 Assess the product baseline, design implications, and component integration to ensure that they are within the product scope.
	2.2 Data Management	2.2.1 Oversee data management to ensure data integrity and consistency.
	2.3 Information Systems/Network Security/Information Assurance	2.3.1 Assess and oversee the information assurance system plan to protect the program's integrity.
	2.4 IM/IT Architecture	2.4.1 Assess and oversee architectural methods, design, and protocols of the program to ensure consistency and performance.
	2.5 System Integration	2.5.1 Integrate T&E and V&V to manage large-scale IM/IT procurements.
	2.6 Systems Life-Cycle	2.6.1 Assess IM/IT life-cycle management concepts, policies and strategic goals to assess usability.
3. Systems Engineering	3.1 Technical Management Process	3.1.1 Develop decision analysis methods and oversee technical plans to meet systems engineering process goals.
	3.1 Technical Management Process	3.1.2 Oversee configuration, technical data, and interface management methods to ensure and maintain the consistency of product's attributes.
	3.2 Technical Process	3.2.1 Translate, in coordination with the user, their needs into performance parameters and constraints to ensure affordability, maintain the schedule and preserve technical feasibility.
	3.2 Technical Process	3.2.2 Monitor the incorporation of the lowest-level system elements into higher elements of physical and logical architecture to improve system integration and structure.
4. Software	4.1 Software Quality	4.1.1 Oversee software quality assurance processes to ensure that the product achieves its objectives.
	4.2 Software Development	4.2.1 Oversee S/W development process and the implementation of COTS to ensure the quality of the product.

	4.3 Software Reuse	4.3.1 Manage S/W reuse, repositories, and plans for obsolescence to meet the product's objectives and achieve its mission.
5. Science and Technology (S&T) Management	5.1 Program Considerations	5.1.1 Oversee the transition of S&T into operational systems that will achieve the product's objectives.
	5.2 Identify and Protect Technologies	5.2.1 Reduce security risks when introducing new technologies into the acquisition process to ensure the integrity of the product.
6. Test and Evaluation (T&E)	6.1 T&E Strategy (TES), Master Plan & TEMP	6.1.1 Develop a comprehensive T&E strategy that evolves into a T&E Master Plan to correlate with the objectives of the IMP and Systems Engineering Plan.
	6.2 Readiness for Initial Operational T&E (IOT&E); system suitability	6.2.1 Determine whether the system is suitable and sufficiently mature to work under operational conditions.
7. Life Cycle Logistics (LCL)	7.1 Life-cycle Logistic (LCL) Management, Product Support Interoperability and Materiel & Supply Chain Management	7.1.1 Oversee fielding, sustainment and the materiel supply chain in order to manage the options for supporting the performance-based logistical objectives.
	7.2 Life-cycle Cost Optimization, Data Management and System Responsiveness	7.2.1 Assess total logistics costs to determine affordability.
	7.2 Life-cycle Cost Optimization, Data Management and System Responsiveness	7.2.2 Oversee the life-cycle data management process and the need for long-term technical data rights to identify and eliminate data management problems.
	7.2 Life-cycle Cost Optimization, Data Management and System Responsiveness	7.2.3 Validate the program's responsiveness capabilities to determine whether users receive materiel as needed.
8. Contracting	8.1 Contract Approach	8.1.1 Oversee the Acquisition Plan, structuring competition, socio-economic terms/conditions, contract types, risk, Alpha, policies, etc., to optimize the program's strategic goals.
	8.2 Prepare Requirements & Support Documentation	8.2.1 Oversee the coordination of documents and interfaces related to RFP preparation (incentives, CLIN structure, technical execution, complex funding, funds reporting and provisions for follow-on contracts) in order to optimize the flow of contract information.
	8.3 Prepare and Issue Solicitation	8.3.1 Oversee SOW requirements, coordinate pre-solicitation activities with industry partners, and participate in pre-award activities to prepare for the release of RFPs.
	8.4 Perform Source Selection	8.4.1 Oversee the application of source selection criteria and assess risk reduction and negotiation positions to achieve program goals.
	8.5 Award and Administer Contract	8.5.1 Support and monitor the award and startup process to ensure contractor/government alignment and proper execution of the contract.
	8.6 Performance-based Service agreements	8.6.1 Manage the acquisition of services and negotiate a performance baseline to obtain performance-based service agreements with users.

9. Business Cost Estimating and Financial Management	9.1 Cost Estimating	9.1.1 Oversee the program's cost estimation process and analytical principles to ensure the most cost-effective purchase of resources.
	9.2 Dept/Agency Programming, Planning and Budgeting Type System	9.2.1 Supervise application of OMB A-11 (Budget Estimates) plus Exhibit 300 (IT) and OMB Program Assessment Rating Tool (PART) to ensure compliance with government directives.
10. Production, Quality & Manufacturing (PQM) and Fielding/Deployment	10.1 Plan/Readiness for Production	10.1.1 Assess readiness for low-rate and/or later full-rate production to achieve an efficient manufacturing capability.
	10.2 Produce Product	10.2.1 Manage the application of manufacturing standards (i.e. NIST, ISO, ANSI, etc.) to ensure program discipline and compliance.
	10.2 Produce Product	10.2.2 Supervise contracting strategies unique to production for long-lead and/or indefinite delivery/quantity, multi-year procurements and plan for line shut-down to ensure optimum use of resources.

Appendix B: Professional Competency Portion

Competency Name	Description
Oral Communication	Makes clear and convincing oral presentations. Listens effectively; clarifies information as needed.
Team Building	Inspires and fosters team commitment, spirit, pride, and trust. Facilitates cooperation and motivates team members to accomplish group goals.
Flexibility	Is open to change and new information; rapidly adapts to new information, changing conditions, or unexpected obstacles.
Influencing and Negotiating	Persuades others; builds consensus through give and take; gains cooperation from others to obtain information and accomplish goals.
Interpersonal Skills*	Treats others with courtesy, sensitivity, and respect. Considers and responds appropriately to the needs and feelings of different situations
Decisiveness	Makes well-informed, effective, and timely decisions, even when data are limited or solutions produce unpleasant consequences; perceives the impact and implications of decisions.
Partnering	Develops networks and builds alliances; collaborates across boundaries to build strategic relationships and achieve common goals.
Resilience	Deals effectively with pressure; remains optimistic and persistent, even under adversity. Recovers quickly from setbacks
Problem Solving	Identifies and analyzes problems; weighs relevance and accuracy of information; generates and evaluates alternative solutions; makes recommendations.
Accountability	Holds self and others accountable for measurable high-quality, timely, and cost-effective results. Determines objectives, sets priorities, and delegates work. Accepts responsibility for mistakes. Complies with established control systems and rules.

Appendix C: Proficiency Standards Developed From Means of Employees*

Note: Only employees with career level demarcation from supervisors were included in the means below

Competency	Entry	Journey	Senior
1.1 Requirements Process (Pre-Project/Pre-Program)	2.30	2.60	3.09
1.2 Concept Selection Process (Pre-Project/Pre-Program); Technology Development Strategy	2.43	2.96	3.48
1.3 Technology Development Process (Pre-Project/Pre-Program)	2.27	2.78	3.28
1.4 Core Management Skills and Processes	2.30	2.81	3.30
1.5 Life-Cycle Cost Management	1.88	2.59	2.98
1.6 Risk and Opportunity Management	2.30	2.99	3.34
1.7 Joint/Inter-Agency/International Program Management	1.80	2.54	2.69
1.8 Working Groups and Teams	2.92	3.41	3.91
2.1 Configuration Management	2.38	2.78	3.21
2.2 Data Management	2.48	2.89	3.00
2.3 Information Systems/Network Security/Information Assurance	2.25	2.42	2.50
2.4 IM/IT Architecture	1.90	2.32	2.59
2.5 System Integration	2.20	2.19	2.51
2.6 Systems Life-Cycle	1.95	2.23	2.43
3.1 Technical Management Process	2.53	2.61	3.11
3.2 Technical Process	2.15	2.78	3.12
4.1 Software Quality	2.00	2.15	2.34
4.2 Software Development	1.83	2.25	2.41
4.3 Software Reuse	1.75	2.04	2.11
5.1 Program Considerations	2.06	2.39	2.77
5.2 Identify and Protect Technologies	2.00	2.24	2.44
6.1 T&E Strategy (TES), Master Plan & TEMP	1.90	2.51	2.88
6.2 Readiness for Initial Operational T&E (IOT&E); system suitability	2.33	2.68	3.10
7.1 Life-cycle Logistic (LCL) Management, Product Support Interoperability and Materiel & Supply Chain Management	2.64	2.75	2.84
7.2 Life-cycle Cost Optimization, Data Management and System Responsiveness	2.27	2.60	2.78
8.1 Contract Approach	2.44	2.68	3.18
8.2 Prepare Requirements & Support Documentation	2.50	2.92	3.22
8.3 Prepare and Issue Solicitation	2.32	3.00	3.33

Competency	Entry	Journey	Senior
8.4 Perform Source Selection	2.14	2.68	3.19
8.5 Award and Administer Contract	2.23	2.85	3.24
8.6 Performance-based Service agreements	2.10	2.42	2.86
9.1 Cost Estimating	2.13	2.63	3.07
9.2 Dept/Agency Programming, Planning and Budgeting Type System	1.47	1.90	2.10
10.1 Plan/Readiness for Production	1.84	2.11	2.64
10.2 Produce Product	1.75	2.10	2.53

Appendix D: Ratings Breakdown by Competency Type

The following pages detail how the changes were made to the Proposed Competency Model in the Phase III transition

	Significantly Lower than Comparison
	Significantly Higher than Comparison
	Significantly Higher than Other Highlighted Groupings
	Significantly Lower than Other Highlighted Groupings

Competency	Assignment Type	Frequency Mean	Criticality Mean	Proficiency Mean
Comp 1 - 1.1 Requirements Process (Pre-Project/Pre-Program)	Weapons Systems	3.0	2.9	3.0
	Business Management	2.7	2.8	2.8
	Services	2.8	2.7	2.8
	International	2.7	2.4	2.8
	Total	2.9	2.8	3.0
Comp 2 - 1.2 Concept Selection Process (Pre-Project/Pre-Program); Technology Development Strategy	Weapons Systems	3.4	3.3	3.3
	Business Management	3.4	3.2	3.1
	Services	3.1	3.1	3.0
	International	3.6	3.3	3.2
	Total	3.4	3.2	3.2
Comp 3 - 1.3 Technology Development Process (Pre-Project/Pre-Program)	Weapons Systems	3.1	3.4	3.2
	Business Management	2.9	3.0	2.9
	Services	2.7	2.8	2.8
	International	2.8	2.7	3.1
	Total	3.0	3.2	3.1
Comp 4 - 1.4 Core Management Skills and Processes	Weapons Systems	3.1	3.3	3.2
	Business Management	2.9	3.0	3.0
	Services	2.7	2.7	2.8
	International	2.8	2.7	3.0
	Total	3.0	3.2	3.1

Comp 5 - 1.5 Life-Cycle Cost Management	Weapons Systems	2.9	3.1	2.8
	Business Management	3.0	3.2	2.8
	Services	2.8	2.9	2.5
	International	3.3	3.2	3.0
	Total	2.9	3.1	2.8
Comp 6 - 1.6 Risk and Opportunity Management	Weapons Systems	3.6	3.6	3.3
	Business Management	3.4	3.3	3.1
	Services	3.3	3.2	3.0
	International	3.4	3.2	3.3
	Total	3.5	3.5	3.2
Comp 7 - 1.7 Joint/Inter-Agency/International Program Management	Weapons Systems	2.4	2.3	2.5
	Business Management	2.0	2.0	2.3
	Services	2.2	2.3	2.4
	International	4.8	4.6	4.3
	Total	2.4	2.4	2.5
Comp 8 - 1.8 Working Groups and Teams	Weapons Systems	4.2	4.1	3.8
	Business Management	3.9	3.7	3.5
	Services	3.7	3.5	3.5
	International	4.2	4.0	4.0
	Total	4.1	3.9	3.7
Comp 9 - 2.1 Configuration Management	Weapons Systems	3.2	3.3	3.1
	Business Management	3.0	3.1	2.8
	Services	2.9	2.9	2.8
	International	3.0	3.0	3.0
	Total	3.1	3.2	3.0
Comp 10 - 2.2 Data Management	Weapons Systems	2.8	2.9	2.8
	Business Management	3.0	3.2	2.8
	Services	3.0	2.9	2.8
	International	2.8	2.8	2.9
	Total	2.9	2.9	2.8
Comp 11 - 2.3 Information Systems/Network Security/Information Assurance	Weapons Systems	2.5	2.9	2.4
	Business Management	2.8	3.1	2.5
	Services	2.6	2.8	2.3
	International	2.4	2.8	2.5
	Total	2.6	2.9	2.4
Comp 12 - 2.4 IM/IT Architecture	Weapons Systems	2.4	2.6	2.4
	Business Management	2.5	2.8	2.4
	Services	2.3	2.4	2.3
	International	2.2	2.2	2.3
	Total	2.4	2.6	2.4
Comp 13 - 2.5 System Integration	Weapons Systems	2.2	2.5	2.4
	Business Management	2.4	2.7	2.4
	Services	1.8	2.1	2.2
	International	1.5	1.9	1.9
	Total	2.2	2.5	2.3

Comp 14 - 2.6 Systems Life-Cycle	Weapons Systems	2.3	2.4	2.3
	Business Management	2.6	2.7	2.4
	Services	2.2	2.3	2.2
	International	1.8	2.1	2.0
	Total	2.3	2.4	2.3
Comp 15 - 3.1 Technical Management Process	Weapons Systems	3.0	3.1	3.0
	Business Management	2.7	2.8	2.6
	Services	2.4	2.6	2.6
	International	2.6	2.6	2.9
	Total	2.9	3.0	2.8
Comp 16 - 3.2 Technical Process	Weapons Systems	3.0	3.2	3.0
	Business Management	2.7	2.9	2.6
	Services	2.6	2.6	2.6
	International	2.6	2.7	2.6
	Total	2.8	3.1	2.9
Comp 17 - 4.1 Software Quality	Weapons Systems	2.4	2.8	2.4
	Business Management	2.5	2.8	2.4
	Services	1.8	2.1	2.0
	International	2.1	2.6	2.3
	Total	2.3	2.7	2.3
Comp 18 - 4.2 Software Development	Weapons Systems	2.5	2.8	2.4
	Business Management	2.6	2.8	2.4
	Services	2.0	2.2	2.1
	International	2.3	2.7	2.4
	Total	2.4	2.7	2.4
Comp 19 - 4.3 Software Reuse	Weapons Systems	2.1	2.4	2.2
	Business Management	2.1	2.3	2.3
	Services	1.7	2.0	2.0
	International	1.9	2.1	2.2
	Total	2.1	2.3	2.2
Comp 20 - 5.1 Program Considerations	Weapons Systems	2.7	2.8	2.8
	Business Management	2.2	2.3	2.3
	Services	2.1	2.2	2.4
	International	1.9	1.8	2.2
	Total	2.5	2.6	2.6
Comp 21 - 5.2 Identify and Protect Technologies	Weapons Systems	2.6	2.9	2.4
	Business Management	2.6	2.9	2.3
	Services	2.3	2.5	2.3
	International	2.3	2.6	2.4
	Total	2.5	2.8	2.4
Comp 22 - 6.1 T&E Strategy (TES), Master Plan & TEMP	Weapons Systems	2.6	3.1	3.0
	Business Management	2.3	2.7	2.5
	Services	2.2	2.4	2.7
	International	2.1	2.4	2.4
	Total	2.5	2.9	2.7

Comp 23 - 6.2 Readiness for Initial Operational T&E (IOT&E); system suitability	Weapons Systems	2.9	3.4	3.0
	Business Management	2.6	2.9	2.5
	Services	2.5	2.7	2.7
	International	2.4	2.7	2.4
	Total	2.8	3.2	2.9
Comp 24 - 7.1 Life-cycle Logistic (LCL) Management, Product Support Interoperability and Materiel & Supply Chain Management	Weapons Systems	2.9	3.1	2.9
	Business Management	2.6	2.8	2.6
	Services	2.6	2.7	2.5
	International	3.2	3.1	2.8
	Total	2.8	3.0	2.7
Comp 25 - 7.2 Life-cycle Cost Optimization, Data Management and System Responsiveness	Weapons Systems	2.7	2.9	2.7
	Business Management	2.5	2.7	2.6
	Services	2.4	2.5	2.5
	International	2.9	2.8	2.9
	Total	2.6	2.8	2.7
Comp 26 - 8.1 Contract Approach	Weapons Systems	3.1	3.3	3.0
	Business Management	2.9	3.1	2.9
	Services	2.8	3.1	2.8
	International	3.2	3.2	3.1
	Total	3.0	3.2	3.0
Comp 27 - 8.2 Prepare Requirements & Support Documentation	Weapons Systems	3.1	3.4	3.1
	Business Management	3.0	3.4	3.0
	Services	3.0	3.3	2.9
	International	3.3	3.2	3.1
	Total	3.1	3.4	3.1
Comp 28 - 8.3 Prepare and Issue Solicitation	Weapons Systems	3.2	3.4	3.2
	Business Management	3.0	3.3	3.0
	Services	3.0	3.3	2.9
	International	3.5	3.5	3.4
	Total	3.1	3.4	3.2
Comp 29 - 8.4 Perform Source Selection	Weapons Systems	2.6	3.2	3.0
	Business Management	2.6	3.1	2.9
	Services	2.6	3.1	2.9
	International	2.6	2.8	2.8
	Total	2.6	3.1	3.0
Comp 30 - 8.5 Award and Administer Contract	Weapons Systems	2.9	3.3	3.1
	Business Management	2.8	3.2	3.0
	Services	2.8	3.2	2.9
	International	3.0	3.3	3.1
	Total	2.9	3.2	3.0
Comp 31 - 8.6 Performance-based Service agreements	Weapons Systems	2.4	2.7	2.6
	Business Management	2.6	2.8	2.7
	Services	2.5	2.8	2.5
	International	2.7	2.7	2.8
	Total	2.5	2.7	2.6

Comp 32 - 9.1 Cost Estimating	Weapons Systems	2.9	3.2	2.8
	Business Management	3.1	3.2	2.8
	Services	2.8	3.0	2.6
	International	3.4	3.4	2.9
	Total	3.0	3.2	2.8
Comp 33 - 9.2 Dept/Agency Programming, Planning and Budgeting Type System	Weapons Systems	1.8	2.2	2.0
	Business Management	2.3	2.6	2.3
	Services	1.7	2.0	1.9
	International	1.5	1.7	1.8
	Total	1.9	2.2	2.0
Comp 34 - 10.1 Plan/Readiness for Production	Weapons Systems	2.4	2.8	2.6
	Business Management	2.0	2.2	2.1
	Services	1.8	2.1	2.1
	International	1.7	1.7	2.3
	Total	2.2	2.6	2.4
Comp 35 - 10.2 Produce Product	Weapons Systems	2.1	2.5	2.4
	Business Management	1.9	2.2	2.1
	Services	1.8	2.0	2.1
	International	1.9	2.1	2.3
	Total	2.0	2.3	2.3

Appendix E: Mapping Phase III Revisions - Phase II to Phase IV Competency Model

The following pages detail how the changes were made to the Proposed Competency Model in the Phase III transition

Unit	Competency	Current Elements	Competency (Oct 2007)	Element (Oct 2007)
1. Management Process	1.1 Requirements Process (Pre-Project/Pre-Program)	1.1.1 Evaluate, relative to capability gaps, materiel/non-materiel concepts to develop a program definition.	1.1 Requirements Processes (Pre-program)	1.1.1 Manage Agency effort aimed at identifying, assessing and prioritizing needed mission oriented Agency capability needs vs. capability gaps.
1. Management Process			1.1 Requirements Processes (Pre-program)	1.1.2 Initiate and evaluate, if applicable, studies of different non-system specific, or activity specific, materiel and non-materiel approaches (concepts) to provide a required capability.
1. Management Process	1.2 Concept Selection Process (Pre-Project/Pre-Program); Technology Development Strategy	1.2.1 Refine concepts, analysis of alternatives and assumptions to select a preferred course of action.	1.2 Concept Selection Process (Pr-program)	1.2.1 Track and evaluate analysis of the alternative concepts to reduce the number and refine the concept(s) to better meet the mission capability gap, while reviewing/performing new or expanded studies of performance, effectiveness, suitability, critical technologies, estimated costs, sensitivities, risks, competition, innovation and assumptions.
1. Management Process			1.2 Concept Selection Process (Pr-program)	1.2.2 Offer recommendations in Agency selection of materiel/non-materiel course of action relative to satisfying the capability gap.
1. Management Process			1.2 Concept Selection Process (Pr-program)	1.2.3 Oversee the establishment of performance measures and associated metrics required to evaluate a possible materiel solutions.
1. Management Process			1.2 Concept Selection Process (Pr-program)	1.2.4 Offer recommendations on a preferred system concept that may correct the deficiency, satisfy a capability gap, or incorporate a new technology that results in the development, acquisition, procurement and/or deployment of a new item that should be continued into Technology Development.
1. Management Process			1.2 Concept Selection Process (Pr-program)	1.2.5 Oversee the preparation of a Technology Development Strategy that flows from the completed analysis of alternatives and selected materiel concepts that at completion of a Technology Development Phase will allow a Milestone Decision Authority to determine that technologies are sufficiently mature.

1. Management Process	1.3 Technology Development Process (Pre-Project/Pre-Program)	1.3.1 Expand user's needs to determine program system requirements, KPPs and Acq Base-line.	1.3 Technology Development Process (Pre-program)	1.3.1 Evaluate, together with the user, "customer needs" ensuring that they support pending program initiation, they are stated in terms of program system requirements, are consistent with documents that identify the capability gap(s) in need of a materiel solution, respond to Agency acquisition policies, track the user's capabilities development document(s), refine the integrated architecture, and clarify how the program will lead to the needed capability.
1. Management Process	1.3 Technology Development Process (Pre-Project/Pre-Program)	1.3.2 Prepare Acquisition Strategy with stakeholder support to ensure that it is aligned with program objectives.	1.3 Technology Development Process (Pre-program)	1.3.2 Validate key performance parameters that are critical to the development of an effective capability.
1. Management Process			1.3 Technology Development Process (Pre-program)	1.3.3 Derive an acquisition program base-line from the user's performance and schedule requirements, and best estimates of total program cost to be consistent with projected funding.
1. Management Process			1.3 Technology Development Process (Pre-program)	1.3.4 Initiate, oversee and later evaluate technology developments and demonstrations (in coordination with systems engineering and test and evaluation personnel & organizations) for the needed capability under consideration in order to evolve a plan for determining the maturity of the technology, and the outline of a system performance specification.
1. Management Process			1.3 Technology Development Process (Pre-program)	1.3.5 Define interoperability in accordance with agency policy to facilitate future system integration and interoperability.
1. Management Process			1.3 Technology Development Process (Pre-program)	1.3.6 Perform a requirements analysis to identify potential cost, performance or schedule tradeoffs to optimize the program path.
1. Management Process			1.3 Technology Development Process (Pre-program)	1.3.7 Develop a business partnership (teaming) with the Procuring Contracting Officer (PCO) Administrative Contracting Officer (ACO), and other business advisers to build an effective and executable business strategy.
1. Management Process			1.3 Technology Development Process (Pre-program)	1.3.8 Manage the preparation of an Acquisition Strategy (flowing from the Technology Development Strategy), in coordination with the PCO, to ensure full stakeholder support, and consideration of an evolutionary acquisition approach, spiral technology insertion, inter-program dependencies, useful increments or block upgrades, and real-world development processes in terms of flexibility for future contract application, and is balanced with the realities of program execution.
1. Management Process			1.3 Technology Development Process (Pre-program)	1.3.9 Conduct project/program coordination with users, milestone decision authority, industry, and other programs (same agency, other agencies and international, etc.) to minimize schedule and cost impacts.

1. Management Process			1.3 Technology Development Process (Pre-program)	1.3.10 Formally initiate, as appropriate, an Acquisition Project/Program or other Project/Program, ensuring compliance with OMB A-94 analysis requirements and the OMB Program Assessment Rating Tool (PART) to ensure consistency with overarching guidelines.
1. Management Process	1.4 Core Management Skills and Processes	1.4.1 Manage the program strategy, scope of work and resources to streamline the schedule, and meet planned costs.	1.4 Core Management Skills & Processes	1.4.1 Manage the program including defining program scope, application of National Environmental Policy Act (NEPA), environmental, safety, and occupational health (ESOH), and security measures to achieve statutory and regulatory compliance.
1. Management Process	1.4 Core Management Skills and Processes	1.4.2 Plan and document an Integrated Master Plan and Schedule to determine phased inputs, outputs, deliverables, review process, audits, and performance objectives.	1.4 Core Management Skills & Processes	1.4.2 Coordinate a plan for total Life-cycle system management (Integrated Master Plan) so as to organize and document phased inputs, outputs, deliverables for each phase, and internal & external project/program technical reviews, Congressional processes, audits and how various project/program functions will be performed and managed.
1. Management Process	1.4 Core Management Skills and Processes	1.4.3 Prepare a WBS for the program that integrates risks, costs, and overall EVM process from start to finish of the program.	1.4 Core Management Skills & Processes	1.4.3 Oversee preparation/documentation of an integrated master schedule using schedule network tools and techniques, work loading methods, and Agency project management software to produce a schedule in one or more desired formats. (Inputs to this process may include, e.g., activity duration estimates, work breakdown schedule, project baseline, resource calendars, resource requirements, activities parameters, project integrated master plan, etc.)
1. Management Process	1.4 Core Management Skills and Processes	1.4.4 Establish a program team with the suppliers and contractors to plan the process for mapping the organization, aligning resources and coordinating joint program review strategies.	1.4 Core Management Skills & Processes	1.4.4 Supervise/prepare/tailor a program and contract WBSs to provide program structure.
1. Management Process	1.4 Core Management Skills and Processes	1.4.5 Implement and manage the EVM process to track and assess the scope of work, technical performance measurements, and the integrated baseline review process.	1.4 Core Management Skills & Processes	1.4.5 Oversee an analysis, stressing event-based and not schedule driven actions, in support of technical reviews, as a tool for coordination and the identification of risks.
1. Management Process			1.4 Core Management Skills & Processes	1.4.6 Apply project/program management skills to analyze resource needs for program management (including organizing/staffing a team, resourcing a project, training, planning for an EVM program linked to risk, creating a schedule and other basic project management practices.)
1. Management Process			1.4 Core Management Skills & Processes	1.4.7 Add an underlying structure and detail to all program plans and actions, and production processes in particular, to eliminate defects through Six Sigma methods; and the elimination of waste through the use of Lean methods.

1. Management Process			1.4 Core Management Skills & Processes	1.4.8 Institute and oversee EVM base-line review process to establish the contractor's depth and insight into its activity planning and management process.
1. Management Process			1.4 Core Management Skills & Processes	1.4.9 Coordinate with PCO on contracting processes, strategy, agreements, negotiations etc., to ensure a team approach to interacting with the contractor.
1. Management Process			1.4 Core Management Skills & Processes	1.4.10 Conduct financial planning and execution reviews to analyze contractor and or program status and identify managerial actions.
1. Management Process			1.4 Core Management Skills & Processes	1.4.11 Establish a team with the supplier/contractor for organizational mapping, process alignment, joint program review strategies, etc.
1. Management Process			1.4 Core Management Skills & Processes	1.4.12 Employ project management tools to oversee and prioritize the resource allocation to the right task at the right time to improve program execution effectiveness.
1. Management Process	1.5 Life-Cycle Cost Management	1.5.1 Oversee the application of Agency/OMB financial management policies to manage the program costs.	1.5 Life-cycle Cost (Total Ownership Cost) Mgmt (OMB A-94)	1.5.1 Oversee an estimate of Total Ownership Cost (TOC), in Agency format, revisiting and ensuring that it is consistent with prior OMB A-94 and PART analysis as appropriate to consider full program scope in applying cost estimating techniques/tools to cases involving management decisions, e.g., contractor versus government logistics support: See 7.2.1
1. Management Process			1.5 Life-cycle Cost (Total Ownership Cost) Mgmt (OMB A-94)	1.5.2 Interpret and oversee application of Department/Agency financial policies and directives that are applicable to the program such as developing out-year financial plans, budgets estimated in Agency formats, including impacts of Earned Value Management.
1. Management Process	1.6 Risk and Opportunity Management	1.6.1 Establish and manage the risk/opportunity process to reduce risks and exploit opportunities.	1.6 Risk & Opportunity Mgmt (see 3.1.5)	1.6.1 Establish and manage a risk/opportunity management process that is based on demonstrated performance throughout the acquisition process.
1. Management Process			1.6 Risk & Opportunity Mgmt (see 3.1.5)	1.6.2 Apply decision analysis tools/methodologies in the selection of risk handling options/opportunities for inserting selected options into a detailed Integrated Master Plan and Integrated Master Schedule (IMP/IMS)
1. Management Process			1.6 Risk & Opportunity Mgmt (see 3.1.5)	1.6.3 Develop an organizational structure/method to track and manage risk/opportunities
1. Management Process			1.6 Risk & Opportunity Mgmt (see 3.1.5)	1.6.4 Specify how risk/opportunity management program is to be used within the management of the program, particularly as relates to demonstrated performance.
1. Management Process	1.7 Joint/Inter-Agency/International Program Management	1.7.1 Oversee and manage actions to serve the unique needs of select domestic agencies, and foreign government(s) or international organization(s).	1.7 Joint, Cross Agency, International Mgmt by Single U.S. Exec. Agency	1.7.1 Evaluate acquisition management actions when serving two or more Users who are separate Components within a single Executive Department/Agency.

1. Management Process			1.7 Joint, Cross Agency, International Mgmt by Single U.S. Exec. Agency	1.7.2 Evaluate acquisition management actions when serving two or more Department/Agencies within the federal government,
1. Management Process			1.7 Joint, Cross Agency, International Mgmt by Single U.S. Exec. Agency	1.7.3 Evaluate acquisition management actions when serving a domestic Executive Department(s)/Agency plus a foreign government or international organization,
1. Management Process			1.7 Joint, Cross Agency, International Mgmt by Single U.S. Exec. Agency	1.7.4 Promote Joint/Cross Agency/International Program Management by coordinating within own and other Departments/Agencies to ensure common objectives and managerial expectations.
1. Management Process			1.8 Market Research	1.8.1 Oversee application of FAR Part 10 and 12 in market research to discover affordable technology opportunities and support open and modular architecture as appropriate.
1. Management Process			1.9 Communications Mgmt	1.9.1 Employ correct oral and written skills for effective communication internally and externally about the project or program.
1. Management Process			1.9 Communications Mgmt	1.9.2 Plan for dissemination of information both internally and externally with emphasis to ensure all working groups, project oriented teams, IPPTs, PM Staff and several layers of contractor/sub-contractor employees have comprehensive macro view of the program.
1. Management Process			1.9 Communications Mgmt	1.9.3 Employ effective briefing skills with Executive Branch, Congress, Industry, and Stakeholders to communicate your message effectively and succinctly.
1. Management Process			1.9 Communications Mgmt	1.9.4 Share and communicate lessons learned about the program to improve team members efficiency and effectiveness.
1. Management Process			1.9 Communications Mgmt	1.9.5 Apply the media-related policies contained in Agency directives/publications in addressing public affairs.
1. Management Process	1.8 Working Groups and Teams	1.8.1 Organize, manage, coach, lead and evaluate working groups, IPTs, project-oriented teams and related support contractors and system integrators to maximize efficiency within the program.	1.10 Working Groups & Teams	1.10.1 Organize, manage and lead, as appropriate, the functions of and membership in Integrated Product and/or Process Teams
1. Management Process			1.10 Working Groups & Teams (cont)	1.10.2 Develop metrics for teams to detect initial signs of problems that require management and decision maker attention.
2. Information Management (IM)/Information Technology (IT)	2.1 Configuration Management	2.1.1 Assess the product baseline, design implications, and component integration to ensure that they are within the product scope.	2.1 IM/IT Config Mgmt	2.1.1 Apply and analyze the principles and methods for planning or managing relative to a product baseline, the design, design implementation, structure and content of a performance specification, process for accomplishing modifications/updates, and integration of IM/IT components (hardware, software & firmware version control) for process standardization.

2. Information Management (IM)/Information Technology (IT)	2.2 Data Management	2.2.1 Oversee data management to ensure data integrity and consistency.	2.2 IM/IT Data Mgmt	2.2.1 Apply and analyze the principles, procedures, and tools of data management, such as modeling techniques, data backup, data recovery, data dictionaries, data warehousing, data mining, data disposal, and data standardization processes to ensure efficient project/program execution.
2. Information Management (IM)/Information Technology (IT)	2.3 Information Systems/Network Security/Information Assurance	2.3.1 Assess and oversee the information assurance system plan to protect the program's integrity.	2.3 Information Mgmt	2.3.1 Determine requirements for, organize and maintain information or information management systems to support customer requirements.
2. Information Management (IM)/Information Technology (IT)	2.4 IM/IT Architecture	2.4.1 Assess and oversee architectural methods, design, and protocols of the program to ensure consistency and performance.	2.4 Info Resource Strategy & Planning	2.4.1 Assess and apply appropriate principles, methods, and techniques of Information Management (IM) and Information Technology (IT) requirements assessment, planning, management, business case development (OMB A-94), monitoring, and evaluation, (such as IM/IT baseline assessment, interagency functional analysis, contingency planning, disaster recovery, COTS, plus cross-project/program integration to identify resources and develop a strategy for IT/business systems projects/programs.)
2. Information Management (IM)/Information Technology (IT)			2.5 Info Sys/Network & Security/Info Assurance	2.5.1 Assess methods, tools, and procedures, including development of information assurance system plans and certification & accreditation processes (C&A), to prevent information systems vulnerabilities, and provide or restore security of information systems and network services.
2. Information Management (IM)/Information Technology (IT)			2.6 IM/IT Technology Architecture	2.6.1 Assess and apply architectural methodologies used in the design and development of information systems, use of only open architecture, current protocols, the physical structure of a system's internal operations and interactions with other systems to optimize program architecture.
2. Information Management (IM)/Information Technology (IT)			2.7 IM/IT Performance	2.7.1 Assess the principles, ability to integrate, use of methods and tools (for example, surveys, system performance measures and service-level agreement (SLA)) to assess the quality, efficiency, effectiveness and practicality of information technology systems.
2. Information Management (IM)/Information Technology (IT)			2.8 Infrastructure Design	2.8.1 Evaluate and oversee IM/IT systems engineering including the architecture and typology of software, hardware, networks and systems integration to ensure an affordable and effective systems and infrastructure design.
2. Information Management (IM)/Information Technology (IT)	2.5 System Integration	2.5.1 Integrate T&E and V&V to manage large-scale IM/IT procurements.	2.9 System Integration	2.9.1 Assess the principles, methods, and procedures for installing, integrating, and optimizing information systems components and resources to support system design objectives.
2. Information Management (IM)/Information Technology (IT)			2.9 System Integration	2.9.2 Assess the adequacy and depth of system test and evaluation and software verification and validation processes for large-scale IM/IT procurements.

ion Technol- ogy (IT)				
2. Informa- tion Man- agement (IM)/Informat ion Technol- ogy (IT)	2.6 Systems Life-Cycle	2.6.1 Assess IM/IT life-cycle management concepts, policies and strategic goals to assess usability.	2.10 System Life-Cycle	2.10.1 Assess systems life cycle management concepts used to plan, develop, implement, operate, maintain, support, sustain, modify, upgrade, and retire/replace information sys- tems.
2. Informa- tion Man- agement (IM)/Informat ion Technol- ogy (IT)			2.10 System Life-Cycle	2.10.2 Assess the use of best practice strate- gies in an organizational setting, be able to identify alignment to strategic goals, and evaluate change management implications.
2. Informa- tion Man- agement (IM)/Informat ion Technol- ogy (IT)			2.10 System Life-Cycle	2.10.3 Assess use and results from applying Capital Planning and Investment Control (CPIC), Business Case Analysis (OMB A-94), including requirements of common compo- nent architecture (CCA), OMB A-11 (budget submits) (with Exhibits A-53 and A-300 (Sec- tion 7 of A-11)) and OMB A-130 IT resources.
2. Informa- tion Man- agement (IM)/Informat ion Technol- ogy (IT)			2.11 Mgmt & Technology Awareness	2.1.1 Assess new developments and applica- tions of information management and tech- nology (policies, processes, methods hardware, software, and telecommunications) for application to new or ongoing pro- jects/programs.
3. Systems Engineering	3.1 Technical Management Process	3.1.1 Develop decision analysis methods and oversee technical plans to meet systems engineer- ing process goals.	3.1 Technology Management Process	3.1.1 Manage and appraise decision analysis methods that will provide the basis for evalu- ating and selecting alternatives for decision making.
3. Systems Engineering	3.1 Technical Management Process	3.1.2 Oversee configuration, technical data, and interface management methods to ensure and maintain the consistency of product's attributes.	3.1 Technology Management Process	3.1.2 Oversee, prepare and appraise Techni- cal Plans that will ensure the systems engi- neering processes are applied properly throughout a system's life cycle consistent with the Systems Engineering Plan.
3. Systems Engineering			3.1 Technology Management Process	3.1.3 Oversee a plan for Technical Assess- ment that measures technical progress and the effectiveness of plans and requirements.
3. Systems Engineering			3.1 Technology Management Process	3.1.4 Supervise a requirements management process to provide traceability back to user- defined capabilities.
3. Systems Engineering			3.1 Technology Management Process	3.1.5 Manage Comprehensive Risk/Opportunity Management plan and methods applicable to a systems engineering context that examines the risks of deviating from the program plan.
3. Systems Engineering			3.1 Technology Management Process	3.1.6 Oversee Configuration Management methods and best practices to establish and maintain consistency of a product's attributes with its requirements and product configura- tion information.
3. Systems Engineering			3.1 Technology Management Process	3.1.7 Oversee and appraise a plan for Tech- nical Data Management consisting of the disciplined processes and systems used to plan for, acquire, access, manage, protect, and use data of a technical nature to support the total life cycle of the system.

3. Systems Engineering			3.1 Technology Management Process	3.1.8 Oversee a process for Interface Management, including the ability to trace system requirements through the software allocation architecture that will ensure interface definition and compliance among the elements that compose the system; as well as with other systems with which the system or system elements must interoperate.
3. Systems Engineering	3.2 Technical Process	3.2.1 Translate, in coordination with the user, their needs into performance parameters and constraints to ensure affordability, maintain the schedule and preserve technical feasibility.	3.2 Technical Process	3.2.1 Manage a Requirements Development process with the user to establish and refine operational needs, attributes, performance parameters, trade-offs, and constraints that flow from the needed capabilities to address all relevant program and system requirements.
3. Systems Engineering	3.2 Technical Process	3.2.2 Monitor the incorporation of the lowest-level system elements into higher elements of physical and logical architecture to improve system integration and structure.	3.2 Technical Process	3.2.2 Oversee the process of obtaining sets of logical solutions to improve knowledge of the defined requirements and the relationships among the requirements (e.g., functional, behavioral, temporal).
3. Systems Engineering			3.2 Technical Process	3.2.3 Oversee and appraise a process for monitoring and selecting a Design Solution to translate the outputs of the Requirements Development and Logical Analysis processes into alternative design solutions or the selection of a final design solution
3. Systems Engineering			3.2 Technical Process	3.2.4 Oversee a process for monitoring the Implementation effort that yields the lowest level system elements in the system hierarchy.
3. Systems Engineering			3.2 Technical Process	3.2.5 Oversee a monitoring process for the integration of the lower level system elements into a higher-level system element in the physical and logical architecture.
3. Systems Engineering			3.2 Technical Process	3.2.6 Manage and appraise a process to monitor the verification program which confirms that the system element meets the design-to or build-to specifications.
3. Systems Engineering			3.2 Technical Process	3.2.7 Oversee a process to monitor/coordinate/participate in the validation effort to determine if the right thing was built.
3. Systems Engineering			3.2 Technical Process	3.2.8 Manage a process to monitor/coordinate/participate in the transition program applied to move the system element to the next level in the physical architecture or, for the end-item system, to the user, i.e., fielding/deployment of a system and transition to an Operations & Support Phase.
3. Systems Engineering			3.3 Systems Engineering Plan (SEP)	3.3.1 Prepare and validate the early formulation and continuous update, as appropriate, of a Systems Engineering Plan.
4. Software			4.1 S/W Acq Mgmt & Tech Fundamentals	4.1.1 Manage application of architecture, within a systems plan, for hardware, communications, networking, enterprise licensing and software fundamentals including COTS/ERP management processes.
4. Software	4.1 Software Quality	4.1.1 Oversee software quality assurance processes to ensure that the product achieves its objectives.	4.2 S/W Quality	4.2.1 Oversee software quality, quality assurance, error density, multiple scope view, and IV&V attributes and methods to evaluate program status.

4. Software			4.3 S/W Measurement	4.3.1 Oversee and appraise methods for S/W measurement, capability maturity models, and integrated capability maturity models.
4. Software			4.4 Process maturity & Cost	4.4.1 Oversee development of process maturity rationale, capability analysis method, best practices, appraisal of process models, conduct of process maturity assessments, and methods for determining cost and return on investment.
4. Software			4.5 Critical Requirements	4.5.1 Oversee safety, privacy, and security requirements methods for system conformance to constantly changing requirements.
4. Software			4.6 Data Mgmt	4.6.1 Oversee application of data management, a net centric data management process, and master the importance and legal complexity of data rights associated with software documentation and source code for effective program execution.
4. Software			4.7 S/W Support	4.7.1 Manage development of S/W support, S/W support plan, modifications, upgrades, retirement/replacement and the S/W support lifecycle.
4. Software			4.8 S/W Safety	4.8.1 Oversee and appraise S/W safety issues, procedures and tools (system hazard analysis, software hazard analysis, requirements modeling and analysis for completeness and safety, design for safety, design of human-machine interaction).
4. Software			4.9 S/W Reliability	4.9.1 Manage S/W reliability measurement methods (fault management, deriving operational profiles, and reliability tool kits), as a cost containment and system effectiveness process.
4. Software	4.2 Software Development	4.2.1 Oversee S/W development process and the implementation of COTS to ensure the quality of the product.	4.10 S/W Development	4.10.1 Oversee and appraise a S/W development process, including development plans/approaches, life-cycle reviews, requirements assessments, export control, foreign sourcing, third party transfers, evolutionary and spiral development, and commercial/government off-the-shelf methods to conform to established project/program management guidelines.
4. Software	4.3 Software Reuse	4.3.1 Manage S/W reuse, repositories, and plans for obsolescence to meet the product's objectives and achieve it's mission.	4.11 S/W Reuse	4.11.1 Develop a S/W reuse plan to include software re-use risk assessment, obsolescence, missionization complexities and a program repository to manage previously developed S/W.
4. Software			4.12 S/W Reviews	4.12.1 Evaluate results and recommendations of software intensive system (SIS) expert reviews.
5. Science and Technology (S&T) Management	5.1 Program Considerations	5.1.1 Oversee the transition of S&T into operational systems that will achieve the product's objectives.	5.1 Science & Technology Tracking	5.1.1 Investigate and track user needs that may be better met by iterative assessment of evolving technologies, within a technology development phase of a program, as a means of reducing risk and meeting performance goals.

5. Science and Technology (S&T) Management			5.2 Domestic & Int. Program Considerations	5.2.1 Investigate and track S&T activities of Government, academia, foreign and domestic commercial sources for potential program application.
5. Science and Technology (S&T) Management			5.3 Technology Engineering	5.3.1 Encourage your Agency Acquisition Executive to develop a program of long-range research to transition science, technology and new methods into operational systems.
5. Science and Technology (S&T) Management			5.4 Transition Techniques	5.4.1 Investigate and track Agency-relevant on-going sciences and technologies to anticipate future project/program transition issues.
5. Science and Technology (S&T) Management	5.2 Identify and Protect Technologies	5.2.1 Reduce security risks when introducing new technologies into the acquisition process to ensure the integrity of the product.	5.5 Identify & Protect Technologies	5.5.1. Oversee management techniques to reduce security risks when introducing new technologies into the acquisition process from laboratories and research centers, academia, and foreign and domestic commercial sources.
6. Test and Evaluation (T&E)	6.1 T&E Strategy (TES), Master Plan & TEMP	6.1.1 Develop a comprehensive T&E strategy that evolves into a T&E Master Plan to correlate with the objectives of the IMP and Systems Engineering Plan.	6.1 Integration of T&E	6.1.1 Oversee a comprehensive, integrated, event driven T&E program, including Modeling & Simulation, to provide accurate, timely, and essential information to decision makers.
6. Test and Evaluation (T&E)	6.2 Readiness for Initial Operational T&E (IOT&E); system suitability	6.2.1 Determine whether the system is suitable and sufficiently mature to work under operational conditions.	6.2 T&E Issues	6.2.1 Assess issues pertaining to unique T&E features of a program, i.e., pre-first milestone testing, full-up systems level testing, Agency special T&E program items, and evolutionary acquisition testing issues.
6. Test and Evaluation (T&E)			6.3 Test & evaluation Strategy (TES)	6.3.1 Oversee and validate a comprehensive Test & Evaluation Strategy (TES) by the completion of a Concept Refinement Phase and prior to initiation of a Technology Development Phase as a basis for the Test & Evaluation Master Plan (TEMP).
6. Test and Evaluation (T&E)			6.4 T&E master Plan (TEMP)	6.4.1 Oversee a comprehensive TEMP that describes the total T&E planning from component development through realistic or operational T&E to support development, production and acceptance decisions.
6. Test and Evaluation (T&E)			6.5 Readiness for IOT&E	6.5.1 Manage Department/Agency process for determining the system has demonstrated technical maturity under the conditions expected in the Initial OT&E and is not entering Initial OT&E prematurely.
6. Test and Evaluation (T&E)			6.6 Realistic or Operational T&E	6.6.1 Critique realistic test or OT&E program that will determine the operational effectiveness and suitability of a system under realistic operational conditions.
6. Test and Evaluation (T&E)			6.7 Testing Increments of Evolutionary Acq Program	6.7.1 Oversee evolutionary testing techniques suitable to an evolutionary acquisition program strategy, and spiral acquisition/development of IM/IT systems.

7. Life Cycle Logistics (LCL)	7.1 Life-cycle Logistic (LCL) Management, Product Support Interoperability and Materiel & Supply Chain Management	7.1.1 Oversee fielding, sustainment and the materiel supply chain in order to manage the options for supporting the performance-based logistical objectives.	7.1 LCL Mgmt, Product Support & Interoperability	7.1.1 Examine and implement appropriate, innovative, alternative logistics support practices, including best public sector and commercial practices and technology solutions to determine the best customer support options.
7. Life Cycle Logistics (LCL)			7.1 LCL Mgmt, Product Support & Interoperability	7.1.2 Oversee a modular open systems approach (MOSA) to ensure interoperability is a key LCL facilitator.
7. Life Cycle Logistics (LCL)			7.1 LCL Mgmt, Product Support & Interoperability	7.1.3 Oversee logistic risk mitigation analyses early in the design phase to mitigate life cycle costs, improve system design and long term support.
7. Life Cycle Logistics (LCL)			7.1 LCL Mgmt, Product Support & Interoperability	7.1.4 Implement, as appropriate, statutory guidance/law and Title 10 direction regarding organic depot support (e.g., 50/50 law, core workload, etc.).
7. Life Cycle Logistics (LCL)			7.1 LCL Mgmt, Product Support & Interoperability	7.1.5 Oversee materiel management actions involving the coordination of production, inventory, location, and transportation of program items of materiel (and associated information and financial transactions).
7. Life Cycle Logistics (LCL)	7.2 Life-cycle Cost Optimization, Data Management and System Responsiveness	7.2.1 Assess total logistics costs to determine affordability.	7.2 Life-cycle Cost Optimization, Data Mgmt & Integrated Supply Chain Mgmt	7.2.1 Assess total cost to the government of acquisition and ownership over the items useful life.
7. Life Cycle Logistics (LCL)	7.2 Life-cycle Cost Optimization, Data Management and System Responsiveness	7.2.2 Oversee the life-cycle data management process and the need for long-term technical data rights to identify and eliminate data management problems.	7.2 Life-cycle Cost Optimization, Data Mgmt & Integrated Supply Chain Mgmt	7.2.2 Oversee and assess a program life-cycle data management, including COTS, method for the item/system/facilities throughout the product life cycle to optimize supply chain management.
7. Life Cycle Logistics (LCL)	7.2 Life-cycle Cost Optimization, Data Management and System Responsiveness	7.2.3 Validate the program's responsiveness capabilities to determine whether users receive materiel as needed.	7.2 Life-cycle Cost Optimization, Data Mgmt & Integrated Supply Chain Mgmt	7.2.3 Validate and implement an Agency-driven integrated, synchronized, total-system, life-cycle logistics chain to meet user requirements for information and materiel.
7. Life Cycle Logistics (LCL)			7.2 Life-cycle Cost Optimization, Data Mgmt & Integrated Supply Chain Mgmt	7.2.4 Assess the long-term needs for technical data rights to support the system/project and address these needs within the acquisition strategy.
7. Life Cycle Logistics (LCL)			7.3 Log Footprint Minimization, Life-cycle Assessment & Disposal	7.3.1 Manage the logistical and logistical infrastructure (footprint) that an item/system to minimize the burden on the user.
7. Life Cycle Logistics (LCL)			7.3 Log Footprint Minimization, Life-cycle Assessment & Disposal	7.3.2 Manage and assess a method that will carry out ongoing assessments of the fielded item/system and facilities.

7. Life Cycle Logistics (LCL)			7.3 Log Footprint Minimization, Life-cycle Assessment & Disposal	7.3.3 Oversee a plan, early in the program, for the ultimate neutralizing of any harmful aspects of the item/system and disposal of the system in accordance with law and Agency instructions once it is no longer useful.
7. Life Cycle Logistics (LCL)			7.3 Log Footprint Minimization, Life-cycle Assessment & Disposal	7.3.4 Oversee the tracking and capture of post-fielding information on: -- Obsolescence --Diminishing manufacturing sources and material shortages -- Continuous modernization --Technology insertion and modification planning
8. Contracting	8.1 Contract Approach	8.1.1 Oversee the Acquisition Plan, structuring competition, socio-economic terms/conditions, contract types, risk, Alpha, policies, etc., to optimize the program's strategic goals.	8.1 Contract Approach	8.1.1 Oversee a process by which the efforts of the PM and PCO and all other personnel responsible for an acquisition are integrated through a comprehensive plan/acquisition strategy to fulfill the agency need in a timely manner and at a reasonable cost.
8. Contracting	8.2 Prepare Requirements & Support Documentation	8.2.1 Oversee the coordination of documents and interfaces related to RFP preparation (incentives, CLIN structure, technical execution, complex funding, funds reporting and provisions for follow-on contracts) in order to optimize the flow of contract information.	8.2 Prepare Requirements & support Documentation	8.2.1 Participate in pre-award actions required by FAR Subpart 7.1 Acquisition Planning, and the remainder of FAR Parts 1-12 etc., considering key and complex contract terms and conditions for the solicitation.
8. Contracting	8.3 Prepare and Issue Solicitation	8.3.1 Oversee SOW requirements, coordinate pre-solicitation activities with industry partners, and participate in pre-award activities to prepare for the release of RFPs.	8.3 Prepare & Issue Solicitation	8.3.1 Coordinate and complete preparation of a comprehensive program specification and performance-based Statement Of Objectives (SOO) or Statement of Work (SOW) and CDRLs that fully and correctly defines the program, addressing roles and missions of the government and contractor. (See 8.2.1)
8. Contracting			8.3 Prepare & Issue Solicitation	8.3.2 Participate in pre-award policy application determination, FAR (if applicable) Parts 5 (Publicizing Contract Actions), 13 (Simplified Acquisition Procedures) and 14, (Sealed Bidding), etc. to identify solicitation tailoring opportunities.
8. Contracting			8.3 Prepare & Issue Solicitation	8.3.3 Assess pre-solicitation options to include the use of draft solicitation, industry days and one-on-one sessions.
8. Contracting			8.3 Prepare & Issue Solicitation	8.3.4 Assess change requests to SOWs during the solicitation and evaluation process to determine impact on life cycle costs.
8. Contracting			8.3 Prepare & Issue Solicitation	8.3.5 Assess Economy Act requirements as pertains to interagency acquisitions and the placement of orders between major organizational units within an agency.
8. Contracting	8.4 Perform Source Selection	8.4.1 Oversee the application of source selection criteria and assess risk reduction and negotiation positions to achieve program goals.	8.4 Perform Source Selection	8.4.1 Assess application of source selection criteria including risk analysis methods, FAR Part 15/15.3 (if applicable) Contracting By Negotiation/Source Selection etc. for reasonableness and applicability to the acquisition strategy.

8. Contracting			8.4 Perform Source Selection	8.4.2 Participate in the formulation of a source selection plan that allows for best value selection from a competitive solicitation
8. Contracting			8.4 Perform Source Selection	8.4.3 Participate in and understand the structuring of a formal source selection process to include the Source Selection Evaluation Board, Source Selection Advisory Counsel/Committee, and Source Selection Authority to ensure best value to the government.
8. Contracting			8.4 Perform Source Selection	8.4.4 Oversee issues of international sourcing vs. domestic preferences, (Buy American Act, Berry Amendment, Canadian inclusion, etc.,) that restrict sources.
8. Contracting			8.4 Perform Source Selection	8.4.5 Oversee issues of price reasonableness (price analysis, audits, cost analysis) for impact on contract affordability.
8. Contracting	8.5 Award and Administer Contract	8.5.1 Support and monitor the award and startup process to ensure contractor/government alignment and proper execution of the contract.	8.5 Award Contract	8.5.1 Closely monitor performance within the contract award processes, FAR Part 15/15.5 (if applicable) (Contracting By Negotiation/Preaward, Award, and Postaward Notifications, Protests, and Mistakes); or special considerations outside the FAR.
8. Contracting			8.5 Award Contract	8.5.2 Monitor and evaluate government performance relative to rights of a contractor to protest, dispute, and appeal.
8. Contracting			8.6 Administer Contract	8.6.1 Evaluate contract administrative actions for performance, (i.e., COR responsibilities, contract base-lining, etc.,) under FAR Parts 15 & 42 (if applicable) (Contract Administration and Audit Services) for effectiveness and program alignment.
8. Contracting			8.6 Administer Contract	8.6.2 Evaluate the contract modification process, receipt of contractor change proposals, ECP and Value Engineering requirements, risk analysis, and contractor financing requirements for reasonableness, necessity, scope of contract and affordability.
8. Contracting			8.6 Administer Contract	8.6.3 Administer award fee, review CPAR data and provide award fee management and monitoring under performance-based contracting.
8. Contracting			8.6 Administer Contract	8.6.4 Conclude who can direct changes to contracts and how those changes have to be effected to establish a change control process for contract management efficiency and management.
8. Contracting			8.7 Contract Closeout	8.7.1 Oversee procedures for contract closeout, FAR Part 49 (if applicable) (Termination of Contracts).
8. Contracting	8.6 Performance-based Service Agreements	8.6.1 Manage the acquisition of services and negotiate a performance baseline to obtain performance-based service agreements with users.	8.8 Performance-based Service Agreements	8.8.1 Oversee the establishment of Establish a negotiated performance baseline of with operational users, and the corresponding commercial and/or organic support providers to define program/project scope.
8. Contracting			8.8 Performance-based Service Agreements	8.8.2 Oversee negotiations to ensure the required level of support at a cost consistent with available support funding
8. Contracting			8.8 Performance-based Service Agreements	8.8.3 Oversee application of contract management actions when engaged in the acquisition of services.

9. Business Cost Estimating and Financial Management			9.1 Business, Financial Planning & Mgmt	9.1.1 <i>Oversee application of Total Life Cycle Systems Management (TLCSM), or similar concept to develop an end-to-end program definition.</i>
9. Business Cost Estimating and Financial Management	9.1 Cost Estimating	9.1.1 <i>Oversee the program's cost estimation process and analytical principles to ensure the most cost-effective purchase of resources.</i>	9.2 Cost Estimating	9.2.1 <i>Oversee cost estimating processes to ensure validity and appropriateness for the program.</i>
9. Business Cost Estimating and Financial Management			9.3 Earned Value Mgmt (EVM)	9.3.1 <i>Assess earned value management (EVM) policies, methodologies, and software for performance measurement of programs.</i>
9. Business Cost Estimating and Financial Management			9.3 Earned Value Mgmt (EVM)	9.3.2 <i>Manage application of the Integrated Baseline Review (IBR) process to determine the health of the program as well as the contractor's application and understanding of earned value management (EVM) techniques and methods.</i>
9. Business Cost Estimating and Financial Management			9.3 Earned Value Mgmt (EVM)	9.3.3 <i>Oversee analytical and evaluative techniques to determine effective program strategies when earned value management (EVM) indicators are yellow, and/or red, or cross a threshold.</i>
9. Business Cost Estimating and Financial Management			9.4 Financial Reporting & Oversight	9.4.1 <i>Oversee the selection and employment of an information system, comprised of various applications, with many intended financial management uses to track, assess, manage and report on the program and its status.</i>
9. Business Cost Estimating and Financial Management	9.2 Dept/Agency Programming, Planning and Budgeting Type System	9.2.1 <i>Supervise application of OMB A-11 (Budget Estimates) plus Exhibit 300 (IT) and OMB Program Assessment Rating Tool (PART) to ensure compliance with government directives.</i>	9.5 Agency Planning, Programming, Budgeting & Execution (PPBE) Type Process	9.5.1 <i>Supervise application of a Department or Agency's financial management policy/instructions and OMB A-11, for a project/program's financial planning, programming, budget development, and budget execution.</i>
9. Business Cost Estimating and Financial Management			9.5 Agency Planning, Programming, Budgeting & Execution (PPBE) Type Process	9.5.2 <i>Evaluate the allocation and use of funds within appropriation categories for consistency with financial regulations</i>
9. Business Cost Estimating and Financial Management			9.5 Agency Planning, Programming, Budgeting & Execution (PPBE) Type Process	9.5.3 <i>Evaluate financial implications of international partnering (international agreements, dependable undertaking, handling foreign funds, etc.) for incorporating international partners into a new or ongoing program.</i>

10. Production, Quality & Manufacturing (PQM) and Fielding/Deployment			10.1 Industrial Base Assessment	10.1.1 Supervise development of both international and domestic sources that can meet the required need as the primary sources of supply, and industrial base for maintenance and modernization (if applicable).
10. Production, Quality & Manufacturing (PQM) and Fielding/Deployment	10.1 Plan/Readiness for Production	10.1.1 Assess readiness for low-rate and/or later full-rate production to achieve an efficient manufacturing capability.	10.2 Plan & Readiness for Production	10.2.1 Oversee evaluation methods to determine if a system has achieved acceptable performance in development, test and evaluation and realistic or operational assessment; a mature software capability; no significant manufacturing risks; acceptable interoperability; acceptable realistic or operational supportability; affordable throughout the life cycle, optimally funded, and is properly phased for rapid acquisition (if applicable).
10. Production, Quality & Manufacturing (PQM) and Fielding/Deployment	10.2 Produce Product	10.2.1 Manage the application of manufacturing standards (i.e. NIST, ISO, ANSI, etc.) to ensure program discipline and compliance.	10.3 Produce Product	10.3.1 Oversee management actions leading to an adequate and efficient manufacturing capability and required production.
10. Production, Quality & Manufacturing (PQM) and Fielding/Deployment	10.2 Produce Product	10.2.2 Supervise contracting strategies unique to production for long-lead and/or indefinite delivery/quantity, multi-year procurements and plan for line shut-down to ensure optimum use of resources.	10.3 Produce Product	10.3.2 Evaluate application of appropriate recognized standards in judging product performance, i.e. NIST, ISO, ANSI as best practices or as reference standards to improve project execution.
10. Production, Quality & Manufacturing (PQM) and Fielding/Deployment			10.3 Produce Product	10.3.3 Supervise acquisition/contracting strategies that are unique to production such as procurement of long lead items, indefinite delivery/indefinite quantity (idiq) contracts and multi-year procurement.
10. Production, Quality & Manufacturing (PQM) and Fielding/Deployment			10.3 Produce Product	10.3.4 Oversee the development of a plan for production line shut down, including tooling and facilities disposition and post-production life cycle logistics requirements to ensure life cycle support.

Appendix F: Map of the 11 Topic Areas to 10 Units Based on Factor Analysis Results

This figure is intended to show the linkage between the 11 original topic areas and the Units of Competence.

Unit	Unit 1: Information Management (IM), Information Technology (IT), and Software Management	Unit 2: Overseeing the Contracting Process	Unit 3: Life Cycle Planning and Production	Unit 4: Managing Programs and People	Unit 5: Process Management	Unit 6: Life-Cycle Budgeting and Financial Planning	Unit 7: Technical Management Process	Unit 8: Identify and Protect Technologies	Unit 9: International /Joint/Inter-Agency Program Management	Unit 10: PM Professional Competencies
Topic										
1. Management Process				X	X				X	
2. Information Management (IM)/Information Technology (IT)	X			X		X				
3. Systems Engineering							X			
4. Software	X									
5. Science and Technology (S&T) Management					X			X		
6. Test and Evaluation (T&E)			X							
7. Life Cycle Logistics (LCL)			X							
8. Contracting		X								
9. Business Cost Estimating and Financial Management		X				X				
10. Production, Quality & Manufacturing (PQM) and Fielding/Deployment			X							
11. Professional Competencies										X

Appendix G: Gap Analysis for Each Competency

The key below is utilized for each of the tables on the following pages of this appendix.

Key	
More than 30 percent in a Positive Gap category	
More than 30 percent in a Negative Gap category	
A portion with more than 50 percent of the sample ⁵	

⁵ The dark black box surrounding the positive or negative gap portion signifies that there is actually more than 50 percent of the sample on the negative gap portion.

Entry Level Comparisons Were Not Conducted

The findings for Entry Level are not displayed because the sample size was not sufficiently large to approximate the Entry-Level population

Journey Level Comparisons

Table 41. Journey Level Gap Analysis – Competency 1.1 to 1.5

	1.1 Requirements Process (Pre-Project/Pre-Program)		1.2 Concept Selection Process (Pre-Project/Pre-Program); Technology Development Strategy		1.3 Technology Development Process (Pre-Project/Pre-Program)		1.4 Core Management Skills and Processes		1.5 Life-Cycle Cost Management	
	#	Percent	#	Percent	#	Percent	#	Percent	#	Percent
3.01 or More Above	0	.0	0	.0	0	.0	0	.0	0	.0
Between 2.01 and 3.00 Above	25	4.7	32	5.6	18	3.4	5	1.0	24	4.8
Between 1.01 and 2.00 Above	100	18.7	143	25.1	92	17.4	59	12.2	72	14.4
Between 0.00 and 1.00 Above	174	32.5	203	35.7	182	34.4	169	34.8	152	30.4
Proficiency Standard	2.60		2.96		2.78		2.81		2.59	
Between 0.01 and 1.00 Below	140	26.1	118	20.7	149	28.2	183	37.7	147	29.4
Between 1.01 and 2.00 Below	97	18.1	73	12.8	88	16.6	69	14.2	105	21.0
Between 2.01 to 3.00 Below	0	.0	0	.0	0	.0	0	.0	0	.0
More than 3.01 pts Below	0	.0	0	.0	0	.0	0	.0	0	.0
Total	536	100.0	569	100.0	529	100.0	485	100.0	500	100.0

Table 42. Journey Level Gap Analysis - Competency 1.6 to 2.2

	1.6 Risk and Opportunity Management		1.7 Joint/ Inter-Agency/ International Program Management		1.8 Working Groups and Teams		2.1 Configuration Management		2.2 Data Management	
	#	Percent	#	Percent	#	Percent	#	Percent	#	Percent
3.01 or More Above	0	.0	0	.0	0	.0	0	.0	0	.0
Between 2.01 and 3.00 Above	29	5.6	24	5.9	0	.0	25	5.0	36	7.2
Between 1.01 and 2.00 Above	137	26.5	59	14.4	75	14.3	108	21.6	105	21.1
Between 0.00 and 1.00 Above	196	37.9	107	26.2	184	35.0	162	32.5	166	33.4
Proficiency Standard	2.99		2.54		3.41		2.78		2.89	
Between 0.01 and 1.00 Below	103	19.9	106	25.9	177	33.7	137	27.5	113	22.7
Between 1.01 and 2.00 Below	52	10.1	113	27.6	57	10.8	67	13.4	77	15.5
Between 2.01 to 3.00 Below	0	.0	0	.0	33	6.3	0	.0	0	.0
More than 3.01 pts Below	0	.0	0	.0	0	.0	0	.0	0	.0
Total	517	100.0	409	100.0	526	100.0	499	100.0	497	100.0

Table 43. Journey Level Gap Analysis - Competency 2.3 to 3.1

	2.3 Information Systems/Network Security/ Information Assurance		2.4 IM/IT Architecture		2.5 System Integration		2.6 Systems Life-Cycle		3.1 Technical Management Process	
	#	Percent	#	Percent	#	Percent	#	Percent	#	Percent
3.01 or More Above	0	.0	0	.0	0	.0	0	.0	0	.0
Between 2.01 and 3.00 Above	17	3.5	10	2.3	12	3.0	10	2.3	12	2.7
Between 1.01 and 2.00 Above	59	12.3	57	13.3	37	9.3	46	10.7	64	14.4
Between 0.00 and 1.00 Above	134	28.0	106	24.7	103	25.8	96	22.4	122	27.5
Proficiency Standard	2.42		2.32		2.19		2.23		2.61	
Between 0.01 and 1.00 Below	128	26.7	114	26.5	105	26.3	122	28.5	152	34.3
Between 1.01 and 2.00 Below	141	29.4	143	33.3	142	35.6	154	36.0	93	21.0
Between 2.01 to 3.00 Below	0	.0	0	.0	0	.0	0	.0	0	.0
More than 3.01 pts Below	0	.0	0	.0	0	.0	0	.0	0	.0
Total	479	100.0	430	100.0	399	100.0	428	100.0	443	100.0

Table 44. Journey Level Gap Analysis – Competency 3.2 to 5.1

	3.2 Technical Process		4.1 Software Quality		4.2 Software Development		4.3 Software Reuse		5.1 Program Considerations	
	#	Percent	#	Percent	#	Percent	#	Percent	#	Percent
3.01 or More Above	0	.0	0	.0	0	.0	0	.0	0	.0
Between 2.01 and 3.00 Above	17	4.0	17	4.0	20	4.7	20	5.1	17	4.3
Between 1.01 and 2.00 Above	53	12.5	41	9.7	40	9.3	29	7.4	53	13.6
Between 0.00 and 1.00 Above	128	30.2	101	24.0	102	23.7	84	21.4	94	24.0
Proficiency Standard	2.78		2.15		2.25		2.04		2.39	
Between 0.01 and 1.00 Below	134	31.6	130	30.9	123	28.6	102	26.0	105	26.9
Between 1.01 and 2.00 Below	92	21.7	132	31.4	145	33.7	157	40.1	122	31.2
Between 2.01 to 3.00 Below	0	.0	0	.0	0	.0	0	.0	0	.0
More than 3.01 pts Below	0	.0	0	.0	0	.0	0	.0	0	.0
Total	424	100.0	421	100.0	430	100.0	392	100.0	391	100.0

Table 45. Journey Level Gap Analysis – Competency 5.2 to 7.2

	5.2 Identify and Protect Technologies		6.1 T&E Strategy (TES), Master Plan & TEMP		6.2 Readiness for Initial Operational T&E (IOT&E); system suitability		7.1 Life-cycle Logistic (LCL) Management, Product Support Interoperability and Materiel & Supply Chain Management		7.2 Life-cycle Cost Optimization, Data Management and System Responsiveness	
	#	Percent	#	Percent	#	Percent	#	Percent	#	Percent
3.01 or More Above	0	.0	0	.0	0	.0	0	.0	0	.0
Between 2.01 and 3.00 Above	11	2.6	17	3.9	24	5.3	28	6.1	14	3.4
Between 1.01 and 2.00 Above	47	10.9	56	12.9	76	16.9	86	18.8	58	14.2
Between 0.00 and 1.00 Above	103	23.9	126	29.0	118	26.3	137	29.9	130	31.9
Proficiency Standard	2.24		2.51		2.68		2.75		2.60	
Between 0.01 and 1.00 Below	125	29.0	115	26.4	132	29.4	103	22.5	134	32.8
Between 1.01 and 2.00 Below	145	33.6	121	27.8	99	22.0	104	22.7	72	17.6
Between 2.01 to 3.00 Below	0	.0	0	.0	0	.0	0	.0	0	.0
More than 3.01 pts Below	0	.0	0	.0	0	.0	0	.0	0	.0
Total	431	100.0	435	100.0	449	100.0	458	100.0	408	100.0

Table 46. Journey Level Gap Analysis– Competency 8.1 to 8.5

	8.1 Contract Approach		8.2 Prepare Requirements & Support Documentation		8.3 Prepare and Issue Solicitation		8.4 Perform Source Selection		8.5 Award and Administer Contract	
	#	Percent	#	Percent	#	Percent	#	Percent	#	Percent
3.01 or More Above	0	.0	0	.0	0	.0	0	.0	0	.0
Between 2.01 and 3.00 Above	38	8.3	47	9.7	0	.0	36	7.6	43	9.0
Between 1.01 and 2.00 Above	79	17.2	100	20.6	54	11.1	80	16.9	92	19.2
Between 0.00 and 1.00 Above	153	33.3	184	37.9	277	56.8	160	33.8	162	33.9
Proficiency Standard	2.68		2.92		3.00		2.68		2.85	
Between 0.01 and 1.00 Below	107	23.3	99	20.4	0	.0	112	23.7	106	22.2
Between 1.01 and 2.00 Below	82	17.9	56	11.5	93	19.1	85	18.0	75	15.7
Between 2.01 to 3.00 Below	0	.0	0	.0	64	13.1	0	.0	0	.0
More than 3.01 pts Below	0	.0	0	.0	0	.0	0	.0	0	.0
Total	459	100.0	486	100.0	488	100.0	473	100.0	478	100.0

Table 47. Journey Level Gap Analysis – Competency 8.6 to 10.2

	8.6 Performance-based Service agreements		9.1 Cost Estimating		9.2 Dept/Agency Programming, Planning and Budgeting Type System		10.1 Plan/Readiness for Production		10.2 Produce Product	
	#	Percent	#	Percent	#	Percent	#	Percent	#	Percent
3.01 or More Above	0	.0	0	.0	8	2.3	0	.0	0	.0
Between 2.01 and 3.00 Above	31	6.8	25	5.2	18	5.1	14	3.4	12	3.3
Between 1.01 and 2.00 Above	57	12.5	74	15.4	62	17.7	37	9.0	31	8.5
Between 0.00 and 1.00 Above	134	29.5	149	30.9	102	29.1	98	23.7	95	26.0
Proficiency Standard	2.42		2.63		1.90		2.11		2.10	
Between 0.01 and 1.00 Below	125	27.5	139	28.8	161	45.9	124	30.0	132	36.1
Between 1.01 and 2.00 Below	108	23.7	95	19.7	0	.0	140	33.9	96	26.2
Between 2.01 to 3.00 Below	0	.0	0	.0	0	.0	0	.0	0	.0
More than 3.01 pts Below	0	.0	0	.0	0	.0	0	.0	0	.0
Total	455	100.0	482	100.0	351	100.0	413	100.0	366	100.0

Senior Level Comparisons

Table 48. Senior Level Gap Analysis – Competency 1.1 to 1.5

	1.1 Requirements Process (Pre-Project/Pre-Program)		1.2 Concept Selection Process (Pre-Project/Pre-Program); Technology Development Strategy		1.3 Technology Development Process (Pre-Project/Pre-Program)		1.4 Core Management Skills and Processes		1.5 Life-Cycle Cost Management	
	#	Percent	#	Percent	#	Percent	#	Percent	#	Percent
3.01 or More Above	0	.0	0	.0	0	.0	0	.0	0	.0
Between 2.01 and 3.00 Above	0	.0	0	.0	0	.0	0	.0	50	6.6
Between 1.01 and 2.00 Above	80	9.6	103	12.4	123	15.7	97	13.1	210	27.9
Between 0.00 and 1.00 Above	277	33.3	336	40.5	303	38.6	296	40.1	249	33.1
Proficiency Standard	3.09		3.48		3.28		3.30		2.98	
Between 0.01 and 1.00 Below	247	29.7	227	27.3	220	28.0	237	32.1	145	19.3
Between 1.01 and 2.00 Below	151	18.1	111	13.4	104	13.2	90	12.2	98	13.0
Between 2.01 to 3.00 Below	77	9.3	53	6.4	35	4.5	18	2.4	0	.0
More than 3.01 pts Below	0	.0	0	.0	0	.0	0	.0	0	.0
Total	832	100.0	830	100.0	785	100.0	738	100.0	752	100.0

Table 49. Senior Level Gap Analysis – Competency 1.6 to 2.2

	1.6 Risk and Opportunity Management		1.7 Joint/Inter-Agency/International Program Management		1.8 Working Groups and Teams		2.1 Configuration Management		2.2 Data Management	
	#	Percent	#	Percent	#	Percent	#	Percent	#	Percent
3.01 or More Above	0	.0	0	.0	0	.0	0	.0	0	.0
Between 2.01 and 3.00 Above	0	.0	52	7.7	0	.0	0	.0	0	.0
Between 1.01 and 2.00 Above	104	13.6	120	17.8	208	27.5	74	10.0	50	6.8
Between 0.00 and 1.00 Above	299	39.0	177	26.2	355	46.9	240	32.5	397	54.1
Proficiency Standard	3.34		2.69		3.91		3.21		3.00	
Between 0.01 and 1.00 Below	213	27.8	165	24.4	149	19.7	239	32.3	192	26.2
Between 1.01 and 2.00 Below	113	14.7	161	23.9	31	4.1	114	15.4	95	12.9
Between 2.01 to 3.00 Below	38	5.0	0	.0	14	1.8	72	9.7	0	.0
More than 3.01 pts Below	0	.0	0	.0	0	.0	0	.0	0	.0
Total	767	100.0	675	100.0	757	100.0	739	100.0	734	100.0

Table 50. Senior Level Gap Analysis – Competency 2.3 to 3.1

	2.3 Information Systems/Network Security/ Information Assurance		2.4 IM/IT Architecture		2.5 System Integration		2.6 Systems Life-Cycle		3.1 Technical Management Process	
	#	Percent	#	Percent	#	Percent	#	Percent	#	Percent
3.01 or More Above	0	.0	0	.0	0	.0	0	.0	0	.0
Between 2.01 and 3.00 Above	22	3.1	24	3.6	35	5.4	28	4.2	0	.0
Between 1.01 and 2.00 Above	123	17.2	135	20.1	105	16.1	92	13.9	77	11.2
Between 0.00 and 1.00 Above	199	27.8	170	25.3	173	26.5	187	28.2	200	29.0
Proficiency Standard	2.50		2.59		2.51		2.43		3.11	
Between 0.01 and 1.00 Below	215	30.1	185	27.5	157	24.0	170	25.7	238	34.5
Between 1.01 and 2.00 Below	156	21.8	158	23.5	184	28.1	185	27.9	125	18.1
Between 2.01 to 3.00 Below	0	.0	0	.0	0	.0	0	.0	49	7.1
More than 3.01 pts Below	0	.0	0	.0	0	.0	0	.0	0	.0
Total	715	100.0	672	100.0	654	100.0	662	100.0	689	100.0

Table 51. Senior Level Gap Analysis – Competency 3.2 to 5.1

	3.2 Technical Process		4.1 Software Quality		4.2 Software Development		4.3 Software Reuse		5.1 Program Considerations	
	#	Percent	#	Percent	#	Percent	#	Percent	#	Percent
3.01 or More Above	0	.0	0	.0	0	.0	0	.0	0	.0
Between 2.01 and 3.00 Above	0	.0	26	4.0	28	4.3	18	2.9	56	8.4
Between 1.01 and 2.00 Above	70	10.5	96	14.9	108	16.5	70	11.4	154	23.1
Between 0.00 and 1.00 Above	231	34.5	174	27.0	193	29.5	151	24.5	202	30.2
Proficiency Standard	3.12		2.34		2.41		2.11		2.77	
Between 0.01 and 1.00 Below	198	29.6	177	27.5	173	26.5	182	29.5	130	19.5
Between 1.01 and 2.00 Below	123	18.4	171	26.6	152	23.2	195	31.7	126	18.9
Between 2.01 to 3.00 Below	47	7.0	0	.0	0	.0	0	.0	0	.0
More than 3.01 pts Below	0	.0	0	.0	0	.0	0	.0	0	.0
Total	669	100.0	644	100.0	654	100.0	616	100.0	668	100.0

Table 52. Senior Level Gap Analysis – Competency 5.2 to 7.2

	5.2 Identify and Protect Technologies		6.1 T&E Strategy (TES), Master Plan & TEMP		6.2 Readiness for Initial Operational T&E (IOT&E); system suitability		7.1 Life-cycle Logistic (LCL) Management, Product Support Interoperability and Materiel & Supply Chain Management		7.2 Life-cycle Cost Optimization, Data Management and System Responsiveness	
	#	Percent	#	Percent	#	Percent	#	Percent	#	Percent
3.01 or More Above	0	.0	0	.0	0	.0	0	.0	0	.0
Between 2.01 and 3.00 Above	27	4.0	57	8.3	0	.0	52	7.5	5	.8
Between 1.01 and 2.00 Above	116	17.3	167	24.2	71	10.3	161	23.2	98	15.5
Between 0.00 and 1.00 Above	206	30.7	216	31.3	204	29.6	209	30.2	225	35.6
Proficiency Standard	2.44		2.88		3.10		2.84		2.78	
Between 0.01 and 1.00 Below	167	24.9	145	21.0	203	29.5	164	23.7	182	28.8
Between 1.01 and 2.00 Below	154	23.0	105	15.2	126	18.3	107	15.4	122	19.3
Between 2.01 to 3.00 Below	0	.0	0	.0	85	12.3	0	.0	0	.0
More than 3.01 pts Below	0	.0	0	.0	0	.0	0	.0	0	.0
Total	670	100.0	690	100.0	689	100.0	693	100.0	632	100.0

Table 53. Senior Level Gap Analysis - Competency 8.1 to 8.5

	8.1 Contract Approach		8.2 Prepare Requirements & Support Documentation		8.3 Prepare and Issue Solicitation		8.4 Perform Source Selection		8.5 Award and Administer Contract	
	#	Percent	#	Percent	#	Percent	#	Percent	#	Percent
3.01 or More Above	0	.0	0	.0	0	.0	0	.0	0	.0
Between 2.01 and 3.00 Above	0	.0	0	.0	0	.0	0	.0	0	.0
Between 1.01 and 2.00 Above	96	13.8	76	10.9	87	12.4	87	12.5	81	11.7
Between 0.00 and 1.00 Above	202	29.0	225	32.2	258	36.6	230	33.0	223	32.2
Proficiency Standard	3.18		3.22		3.33		3.19		3.24	
Between 0.01 and 1.00 Below	197	28.3	198	28.4	187	26.6	180	25.8	200	28.9
Between 1.01 and 2.00 Below	117	16.8	139	19.9	113	16.1	120	17.2	118	17.1
Between 2.01 to 3.00 Below	85	12.2	60	8.6	59	8.4	80	11.5	70	10.1
More than 3.01 pts Below	0	.0	0	.0	0	.0	0	.0	0	.0
Total	697	100.0	698	100.0	704	100.0	697	100.0	692	100.0

Table 54. Senior Level Gap Analysis - Competency 8.6 to 10.2

	8.6 Performance-based Service agreements		9.1 Cost Estimating		9.2 Dept/Agency Programming, Planning and Budgeting Type System		10.1 Plan/Readiness for Production		10.2 Produce Product	
	#	Percent	#	Percent	#	Percent	#	Percent	#	Percent
3.01 or More Above	0	.0	0	.0	0	.0	0	.0	0	.0
Between 2.01 and 3.00 Above	44	6.5	0	.0	13	2.3	41	6.3	9	1.5
Between 1.01 and 2.00 Above	150	22.1	53	7.6	66	11.8	127	19.6	74	12.5
Between 0.00 and 1.00 Above	199	29.3	202	28.9	103	18.4	175	27.0	146	24.7
Proficiency Standard	2.86		3.07		2.10		2.64		2.53	
Between 0.01 and 1.00 Below	154	22.6	210	30.1	170	30.4	163	25.2	189	31.9
Between 1.01 and 2.00 Below	133	19.6	138	19.8	207	37.0	142	21.9	174	29.4
Between 2.01 to 3.00 Below	0	.0	95	13.6	0	.0	0	.0	0	.0
More than 3.01 pts Below	0	.0	0	.0	0	.0	0	.0	0	.0
Total	680	100.0	698	100.0	559	100.0	648	100.0	592	100.0

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